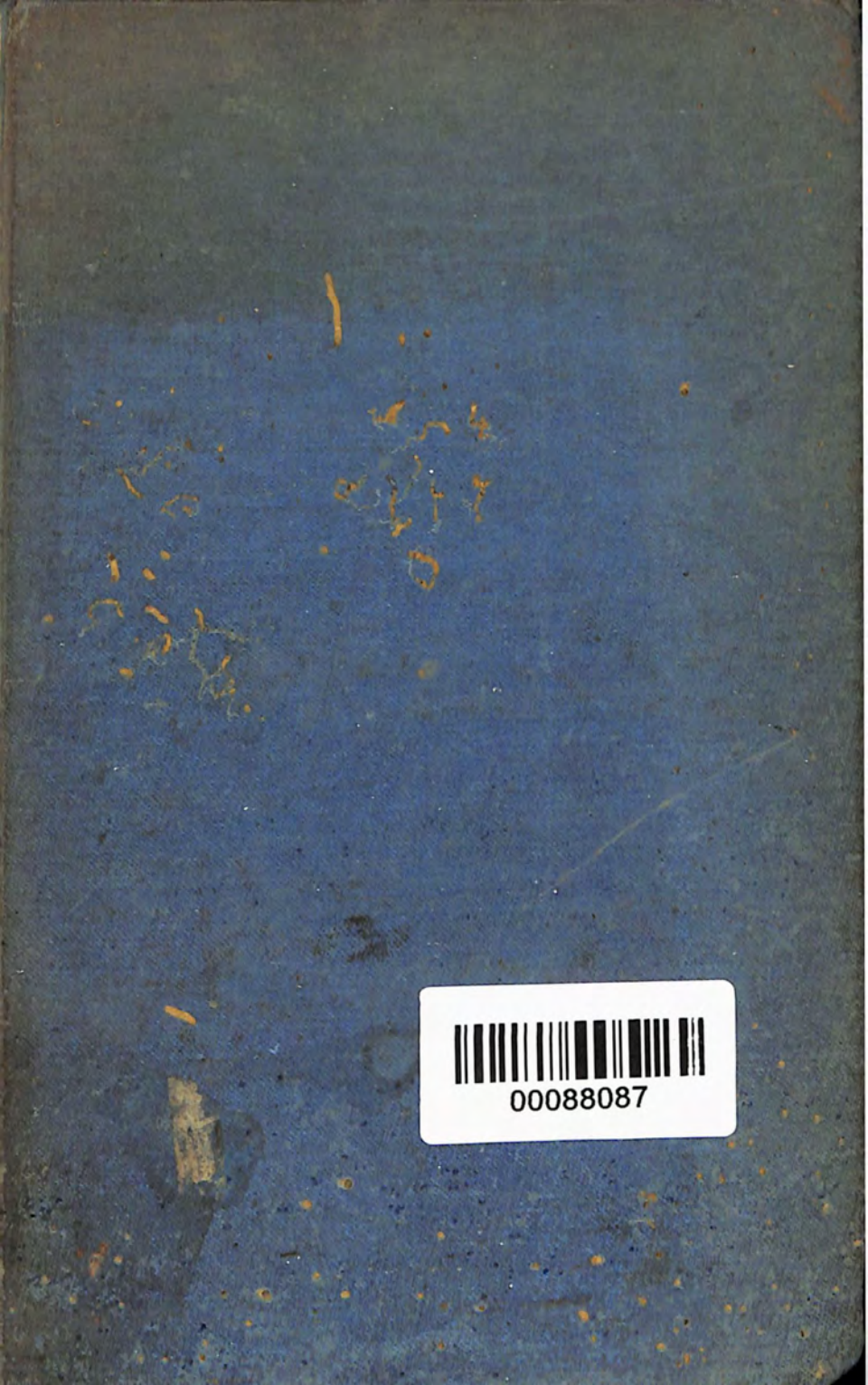
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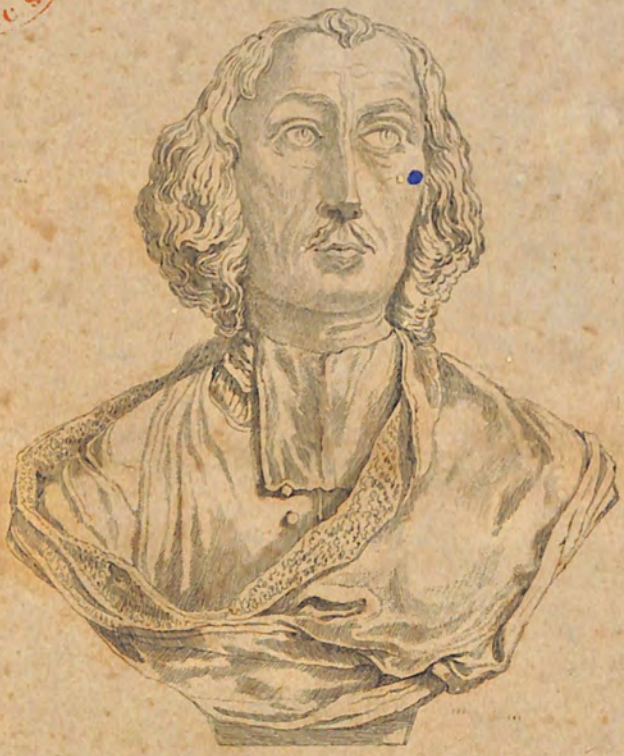

J. M. Inc.

JOAs RAY.

Posuit
Edm. Parforth. A. M.
1751.

FROM THE ORIGINAL PLATE IN THE CAMBRIDGE PORTFOLIO.

THE

CORRESPONDENCE

OF

JOHN RAY:

CONSISTING OF

SELECTIONS FROM THE PHILOSOPHICAL LETTERS PUBLISHED BY DR. DERHAM,

AND

ORIGINAL LETTERS OF JOHN RAY,

IN THE COLLECTION OF THE BRITISH MUSEUM.

CCB.J

EDITED BY

EDWIN LANKESTER, M.D. F.R.S. F.L.S.,

SECRETARY TO THE RAY SOCIETY.

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LONDON:

PRINTED FOR THE RAY SOCIETY.

MDCCCXLVIII.

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PRINTED BY C. AND J. ADLARD,
BARTHOLOMEW CLOSE, LONDON.

PREFACE, BY THE EDITOR.

THIS volume consists of those letters of John Ray and his correspondents which were published shortly after his death; by Dr. Derham; also of a series of his letters addressed to Sir Hans Sloane, and still existing in the library of the British Museum. These last letters were rendered available by the kindness of Sir Henry Ellis, Librarian to the British Museum, through whose means their existence was first made known to the Council of the Ray Society.

Only that part of the correspondence published in the 'Philosophical Letters' which was written by Ray, or addressed to him, has been included in the present volume. The Preface of Dr. Derham to that work, which it has been thought desirable to reprint, alludes to some of the correspondence which has been omitted, on account of its not relating immediately to John Ray.

In preparing these letters for the press, I have been materially assisted by my friend C. C. Babington, Esq., M.A., of St. John's College, Cambridge, who has looked over the proof sheets, given the modern names of the plants referred to in the correspondence, and added many

valuable notes. I am also indebted to William Yarrell, Esq., for the identification and modern names of the animals mentioned in the letters.

The copperplate Portrait of Ray is from a drawing, by Ince, of the bust by Roubiliac, now in the library of Trinity College, Cambridge, and was originally published in the 'Cambridge Portfolio,' edited by the Rev. J. J. Smith, of Caius College, through whose liberality impressions have been permitted to be taken from the original plate. The engraving of Dewlands, the residence of John Ray, and the house in which he died, has been kindly presented to the Society by Jacob H. Pattisson, Esq., LL.B., of Witham House, the present proprietor of Dewlands.

It is hoped that this work will not only be another memorial of the great man after whom the Society by which it is published has been named, but that it may serve as an additional source of information to some future biographer of John Ray.

E. L.

PREFACE

TO

THE PHILOSOPHICAL LETTERS,

By Dr. DERHAM.

To the Reader,

After the death of the late justly famed Mr. Ray, his papers were intrusted with me, that if I thought any of them might be of use to the learned world, I might publish them. When I undertook the labour of perusing and putting them in order, I confess I thought there might have been some tracts designed and fitted up for the public by an author so considerable as Mr. Ray was, who had published so many good things as he had done; but all that I met with was his 'Observations of Insects' (which he lived not to perfect, and which are already printed), and the Diaries of his Travels about Great Britain and in foreign parts, and his Letters to and from learned men. His 'Foreign Travels' he published himself; but for brevity, I find he hath omitted many very good observations that well deserve to see the light. And as for his 'Travels about England, Scotland, and Wales,' I have fitted them up for the press, with an intent to have published them with his 'Life,' which I began to write at the instance of my late much honoured and right reverend diocesan Henry, Lord Bishop of London, and some other very considerable friends, whose impor-

tunities I could not with civility withstand. But, notwithstanding the Itineraries are in a great forwardness, and I have made a considerable progress in his Life, yet I fear I shall scarce be able to accomplish what I intended, having much less leisure now than when I undertook that work.

As to his letters, he had treasured up many, or most of those which he had received from his learned correspondents, which occasioned me a great deal of trouble in perusing them, and selecting such as might be of use to the curious; and after I had selected them, I thought it necessary to leave out all that might be of little use, such as private business, compliments, &c., except now and then a clause, that may be of use to Mr. Ray's, or some other learned man's character, or that may show their learned projects, or give some account of their labours.

So that the reader hath in this collection the marrow and most valuable part of Mr. Ray's correspondences with his learned and ingenious friends. And although there may probably be now and then a few passages of lesser consideration that might have been omitted, and a letter or two that might have been shortened (as it was my mind to have done had I had health and time), yet I hope the reader will find so entertaining and profitable a variety of curious learning, as will sufficiently compensate for defects, and cause him to think that neither I have cast away my time and pains, nor he his cost.

Besides these, there were letters of other learned men at home and abroad, particularly divers from Dr. Hotton, the learned botanic professor of Leyden. But the Doctor's relations (soon after his death, which was not long after Mr. Ray's) strictly forbad the publication of any of

them. And as for the letters of other great men to Mr. Ray, which I have not published, they being matters of thanks and compliment chiefly, would have been of no other use than to have shown what eminent men Mr. Ray corresponded with, and how well they approved of his excellent labours; which, being things sufficiently known, or that may be presumed, I thought it needless to stuff the volume, and enhance its price by so frivolous a means.

And, as I have thus taken care to reject papers of little or no consequence, and to omit in others matters of small consequence, so the learned authors may think I have been too bold with them: but, in answer hereto, I say that I have endeavoured to do, as near as I could, what I thought they would have done themselves. I have omitted for the most part (or inadvertently published) what Mr. Ray or others had published before, unless in some cases, as when it is joined with some other considerable matter unpublished, or serves to explain, illustrate, or render what is published more complete. And I have published what I thought might be instructive or entertaining to the curious, so far as to make a commodious volume. And as for such valuable papers as are omitted, they may make another volume, if this be kindly received.

As to the chasms that may be observed between the dates of some of the letters, and the want of answers to some, it was not from any carelessness or omission in me, but from a defect among the letters themselves, which I conceive were either not preserved, or else the correspondence might be intermitted.

As for the method, I was in doubt whether it was best to put every man's letters by themselves, or according to the order of their dates. But the latter being best

approved of by some of the authors themselves, and that which indeed I had good reasons to esteem best, I accordingly did it as well as I could, abating for a mistake or two, where the papers happened to be mislaid.

Having given an account of what I have done as publisher, it is time to recognise the assistance I had from my friends. Sir Hans Sloane and Dr. Tankred Robinson (two of the principal and most learned friends of Mr. Ray) very readily furnished me with what papers they had of Mr. Ray's; and the latter procured also for me those which Dr. Lister had carefully laid up as Cimelia. Mr. Dale, of Braintree (Mr. Ray's neighbour and industrious friend), who had taken care to preserve many of Mr. Ray's papers after his death, very readily imparted them, and gave me his assistance; as also the Reverend and worthy Mr. Pyke, rector of Mr. Ray's parish, gave me what assistance he could; but none more ready than Mrs. Ray herself, and her daughters, who not only intrusted me to search Mr. Ray's papers, but to carry away what I pleased.

And as for the papers in the Appendix, they are owing to the favour of the surviving remains of Mr. Ray's best friend and patron, the great Mr. Willughby; namely, the Right Honorable the Lord Middleton, and his noble sister the Countess of Carnarvon, who, knowing of my design, with all readiness procured for and sent me Mr. Ray's, and some other learned men's letters to their most ingenious father; which, coming too late to be ranked in their order in the body of the book, I was forced to cast into an Appendix.

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CORRESPONDENCE OF JOHN RAY.

Mr. Ray to Fr. Willughby, Esq.*

Sir,—I have herewithal sent you one of my books, which you had received a week sooner had not the bookbinder deceived me. I need say nothing either to commend or disparage it; you know what it is as well as myself. Since I fully dispatched it, one or two other designs came into my head, which, you being concerned in (I mean in my intentions), I shall communicate to you, and desire first your sentence and opinion concerning the whole; and then, in case of approbation, your particular directions as to the management and carrying on. You remember that we lately, out of 'Gerard,' 'Parkinson,' and 'Phytologia Britannica,' made a collection of rare plants, whose places are therein mentioned, and ranked them under the several counties. My intention now is to carry on and perfect that design; to which purpose I am now writing to all my friends and acquaintance who are skillful in Herbary, to request them this next summer each to search diligently his country for plants, and to send me a catalogue of such as they find, together with the places where they grow. In divers counties I have such as are skillful and industrious: for Warwickshire and Nottinghamshire I must beg your assistance, which I hope, and am confident, you will be willing to contribute. After that, partly by my own

* Memorials, page 13.

search, partly by the mentioned assistance, I shall have got as much information and knowledge of the plants of each country as I can (which will require some years), I do design to put forth a complete P. B., which I hope to bring into as narrow a compass as this book. First, I shall give the names of all plants that are or shall then be found growing in England in an alphabetical order, together with their synonyma, excepting such as are mentioned in this catalogue, whose synonyma I shall omit, setting down only one name, and referring for the rest to 'Cat. Cant.' I shall also put a full Index Anglicolatinus after the manner of that in this catalogue: then I shall put in the counties, with the several rare plants in them marshalled alphabetically. Instead of putting the particular places to each plant in the first catalogue, I shall only refer to this:—as suppose at *Sedum tridactylites alpinum*, after I have given the several synonyma, and the English name; instead of adding the place, I will say, vide Carnarvonshire, &c. My second design is to make another catalogue, which I will call 'Horti Angliæ.' I intend to write to all the noted gardens, to procure a catalogue of each; Oxford garden and Tradescants I have already. Then I shall out of my own garden, and all these, make up one catalogue. Herein I shall give the synonyma of each plant; and those that are not in my garden, I shall name in what places they are; as suppose *Olea sativa*, after I have put down his synonyma and English name, I shall add Tradescants garden, and so of the rest. Into this catalogue I shall not admit any that grow wild in England, lest it swell too big. To this also I shall add a complete Index Anglicolatinus. You have my designs, and I desire your judgment of them. I would not be flattered, I am not so fond of my own conceits: if prudent men think they will be of no use to the public, I am not so foolish to trouble myself and friends to no end but to trouble others. I shall be very glad, sir, to hear from you; and, as I have heretofore received abundance of pleasure and contentment from

your friendship and society, so would it still be some comfort to me to know that I retain a place in your thoughts and esteem, though the meanest. I am, &c.

Coll. Trin., Feb. 25, 1659.

Mr. Ray to Mr. Willughby.

Sir,—On Saturday night last, the 7th instant, Mr. Skippon and myself arrived at Cambridge from a long northern expedition, wherein for the most part we followed your footsteps, proceeding just so far as Sterling and returning by Glasgow. I gave you in a former letter an account of our design and intention, which whether you received or not I know not. In all this journey I met with but four plants which I had not formerly observed, and in Scotland not one. Those are *Pneumonanthe* [*Gentiana Pneumonanthe*, Linn.], which hath a beautiful blue flower, and is perpetual: it grows plentifully in many heathy and moist grounds in Lincolnshire, and the eastern side of Yorkshire, and flowers about the latter end of August. *Sedi alpini parva species* [*S. aizoides*, Linn.], which I have not yet searched out: it hath a yellow flower, and flowers about the beginning of August. This I found only in one small spot of ground about Shap in Westmorland. *Chrysanthemum majus folio valdè laciniato, flore crocco*, J. B. [*Anthemis tinctoria*, Linn.], as I judge. This I found in a bank near to the river Tees, in the bishopric of Durham. *Lapathum folio acuto flore aureo*, C. B. [*Rumex maritimus*, Linn.], which I had before taken some notice of, when I was less careful and curious in distinguishing of plants. I found likewise, near Huntingdon, a plant which the last year I observed, not far from St. Neots, coming to wait upon you, which puzzles me sore: it is between a *Grass* and a *Caryophyllus*, I know not what to call it unless it be *Polygono angustissimo folio affinis*, C. B., but I cannot find that described anywhere. I have sent you a little branch

of it, for your judgment about it. The seed-vessel is large and perfectly to be seen: the flower is a very small yellowish one. You mention a box, which you intend for all *sorts of fruits and seeds*. It must have almost infinite cells and divisions to contain all the varieties of seeds and fruits. Concerning the order and method of it you need not my advice, for I can give you none but what is very obvious, viz., to put those of the same tribe near together. As for instance, to have a drawer with several cells or boxes for nuts, another for cones, &c., for the rest of fruits which may be reduced to several heads; and then one for exotics, which cannot be conveniently referred. In like manner for herbs, to have a drawer with several boxes or divisions for *Legumina*, another the like for *Cerealia*, &c., only those boxes must be more numerous than those of fruits. By a drawer with several boxes, I mean such a thing as the printers put their letters in. There hath been, and still continues to be here, an epidemical sickness in the nature of a fever, which cuts off many old persons and children; but those of middle age it spares. Some of my small company are grievously affected with it. In the north of England, and in Scotland, we heard of no such thing.

Coll. Trin., Sept, 14, 1661.

Mr. Ray to Mr. Willughby.

D. Francisco Willughby J. Wray, S.D.

De mirâ plantarum è semine enatarum metamorphosi, et evariatione à nativâ matrum figurâ, nè dicam specie, tum Robertus, junior, tum D. Brown experimenta aliquot à se facta mihi retulerunt; adeò ut jam penè persuasus sim plantas degenerare posse et intra latitudinem generis seu tribûs suæ speciem mutare. De *Nymphæâ albâ et luteâ minoribus*, jam planè despero, nihil ejusmodi à se unquam visum in fluviis circa aut propè Oxonium affirmat D. Brown. Semina nulla collegi, nec enim præter *Croci*

ulla tum maturuerunt. *Croci* semen in hortulo, D. Brown non antea à me conspectum copiosum vidi, sed nescio quâ incogitantiâ illud omisi et neglexi. Die Lunæ *Cawshamum* vicum uno circiter milliari Readingâ remotum perrexi, illinc non longè in colle cretaceo qui Thamesi imminet *Orchin anthropophoron* [*Aceras anthropophora*, R. Br.] ex instinctu D. Brown inveni, non tamen copiosè. Eandemmet prideñ circa Genevam inveneram; *J. Bauhino Orchis galeâ* et alis ferè cinereis dicitur. Et hic, quod ad plantas spontaneas attinet, solus hujus itineris fructus erat. Die Martis huc veni ubi brevi unius diei quiete interpositâ ut Morgani hortum lustrarem. Die Jovis pedes in Cantium progressus sum usque ad collem Rough-hill dictum, à Darfordia non longè, ut ibi invenirem *Helleborinen albam* [*Cephalanthera grandiflora*] *et Florem Adonidis* [*Adonis autumnalis*, Linn.], quas se illic loci invenisse T. Willisellus asseruit. Sed quamvis non indiligens scrutinium adhibuerim, neutra mihi conspecta est. At neque quicquam de *Flore Adonidis* in arvis illis crescente, à rusticâ turbâ quam sciscitabar, inaudire potui. Inveni quidem *Chamæpityn* [*Ajuga Chamæpitys*, Sm.] *et Perfoliatam* [*Bupleurum rotundifolium*, Linn.] copiosè, et præterea novam *Geranij Columbini foliis magis dissectis* speciem [*Geranium columbinum*, Linn.], quam à se in agris collectam cùm Oxonii essem mihi monstravit Jacobus Bobertus filius.

Mr. Fr. Willughby to Mr. Wray, about the year 1662.

Sir,—I met with several adventures in the remaining part of my journey after I left you; and amongst the rest, with one very lucky one, of a new discovery of medals. You may remember the day we parted I had intended to have gone to Cirencester, but hearing by the way of a great deal of treasure that was found in a field, I presently conjectured it might be Roman coin, and diverted my course thither. The field was near Dursly (a town we left about a mile of the left hand as we rode

from Gloucester), where I found above forty people digging and scraping, and bought a great many silver medals of them; and one incomparable fair one of gold, that had been found a little before. The whole history how these came to be discovered, I shall reserve till I see you. I thought to have made strict inquiry after the Snap-apple bird [the common Cross-bill, *Loxia curvirostra*], but falling very sick at Malverne, I was forced, to give over all.

Dr. CORNELI from Naples, to Mr. WRAY at Rome, 3 Kal. Dec. 1663.

Viro Eruditissimo Johanni Wray.

Thomas Cornelius S.

EGO interea quid de Mannâ compertum habeam, paucis indicabo. Mannæ triplex genus provenit. Unum trunci Ornorum per rimas sponte exsudant, diciturque vulgò *Manna Corporis;* alterum quod ex eâdem arbore incisionibus arte factis extillat, et *Mannam forsatellam* vocant. Tertium tandem in Fraxini frondibus colligitur, *Manna frondis* nuncupatur. Hanc plerique ex aëre in frondes nocturno tempore roris instar decidere arbitrantur; sed ego autopsiâ edoctus sum illam ex ipsis arborum foliis exhalari. Hanc Virgilius roscidi mellis nomine significavit, cum dixit,

Et duræ quercus sudabunt roscida mella.

Causa verò quamobrem ego ita sentiam non debeo reticere. Linteo circa vesperam fraxini frondes velaveram, ut dignoscerem num Manna frondibus extrinsecus adveniret; sed manè inventa sunt folia roscido melle imbuta, nec interea Linteo quicquam inerat, nisi quod ex frondibus illi adhæserat. Perperam igitur Matthiolus commentario in cap. 70, lib. i. Dioscor. reprehendit Altimarum, qui Mannam ex fraxini foliis extillare docuerat. Tu vir sapientissime nostras has disquisitiones æquo animo accipe. Meque ut facis amare perge. Vale Neapoli iii. Kal. Dec. MDCLXIII.

Mr. Fr. Willughby to Mr. Wray.

Sir,—The first thing I saw considerable after I left Montpellier, was a spring of Oleum petroleum at Gabian; at the same place there is a kind of a black pumice stone and a medicinal well. From thence we went to Narbonne, where there is some antiquities; there having a very sore leg, and not being able to endure riding, I resolved to go forward by sea, and went in a little vessel down the river to the sea shore, where we expected good weather almost a week, in which time the plaister of diapalma cured my leg; and, the mariners being out of hopes of a good wind, we bought a pair of mules for about five pistoles apiece, and set forwards to Perpintan, Colliver, and Capo de Creux. Between Colliver and Capo de Creux, we passed the frontiers without any danger, searching, or trouble at all, only at the expense of an *escus* for a guide. At Capo de Creux is the principal place for the coral fishing, and though the wind hindered us from seeing the fishing, I saw the instruments and understood as much about it as if I had seen it taken out of the sea. Thence to Vict, where there is a mine of amethysts, which they call 'violet stones;' by what I saw there, and learned afterwards, I make no question but diamonds, rubies, iacinths, and almost all precious stones, grow just in the same manner as the Bristol diamonds, hexangular and pointed, except agate and corneole, which may be reckoned among pebbles. Thence to Cardona, where there is a mountain of *Sal Fossilis*, which serves all the country thereabouts; the best is hard and transparent like crystal, so as they make beads of it and sell them very cheap at the town. About the mountain some sea-plants. And now I would advise you by all means to make a little tour in Spain, and see the Oleum petrol., the coral, the amethysts, and the salt mountain; but to go no farther than Cardona, unless you resolve upon the Canary voyage, or have a mind to an Andalusian whore. But from Cardona to Xvesca, a great town between

Saragossa and Toulouse, where I heard Seignor La Stannosa has a very famous Museum; the bookseller that told me of it, said it would take up several days to see all the rarities; but very likely it is much lesser than the fame. From Xvesca to Toulouse, where they say there is a cave that hardens bodies into a mummy. In this journey, before you come to Vict, as I remember, you will pass by Aulot, where in divers caves there is spiraculums of air, caused, as they imagine there, by the falling of water. From Cardona I went to Portosa, where I saw a mine of marble, which they call jasper. From Portosa to Valentia; Gandia, where I saw the sugar canes and sugar mills; Chativer, where there is an aqueduct made by the Moors; Caravac, where there is a cross that came down from Heaven; Granada, where there is a palace of the Moors that well deserves a journey of a dozen leagues. Thence to Seville, where I attempted in vain to get a passport for Portugal. I thought then to have gone to Cales, from thence to Tangier, and from Tangier to Lisbon, which was the best way to get into Portugal; but being discouraged by my mule's ill fortune, and the time of the year, I faced about, and returning by land * * * * Toledo, Madrid, Burgos, Vittoria, St. Sebastian, Bayonne, Bourdeaux, Blais, Sainctes, Poictiers, Amboise, Blois, Orleans, and got hither almost a fortnight since. This journey of almost a thousand miles I came all alone, having agreed with my merchant to leave him either at Seville or Lisbon; and, I thank God, escaped very well all along: but at Vittoria and the passage near St. Sebastian was basely troubled with searchers. If you come that way you must manifest your money, at least all your silver, and take a pass. Between Bayonne and Bourdeaux I got a great many notions about the making of turpentine, rosin, pitch, and Yonderone, which I think is tar, the country being full of pines. About Bayonne and St. Sebastian they catch a great many whales every winter; I got there some uncertain notions about the Sperma Ceti. The buying of horses and mules is an excel-

lent way; and you will find it will turn to very good account, and save a great deal of money, if you do not go higher than five or six pistoles a horse. At Seville I found a letter of Dr. Wilkins's, who very importunately persuaded either you or me to make a voyage to the Peak of Teneriffe, and that if * * * * home, and you would undertake it, the Royal Society would defray all your charges, and send you to Cales all necessary instruments and a catalogue of the observations they desired to have made. The Peak is only to be ascended in June and July. When you come to Orleans I hope you will take exact notice of Joan of Arles and Charles VII., statues on the bridge; I saw them as I passed by, but took them for some superstitious foppery, and did not at all regard them. I hope you will all along get the exact government of all the towns.

Mr. Barnham to Mr. Wray.

Sir,—Yours from Montpellier, Jan. the 10th, S. V., came to my hands on Feb. the 6th following, and was answered on the 9th, wherein you give me so great encouragement to employ you by way of information, that I cannot forbear the annexing of this to the other inquiries I gave you in my last; and indeed, though last in order, yet I could wish it may be the first in execution. The thing is this: there is a certain woman in the world, whose name I am obliged to conceal (although possibly you would guess it if your were in England), that hath for this two years laboured under the affliction of a belly that 'hath grown bigger and bigger, and is now much bigger than ever she was when she was with child (for she hath had two children); she went up this last week to London to try all the advice that place can afford, having failed of a cure in the country. The concern I have for her, which indeed is exceeding surpassingly great,

hath made me transgress the bounds of modesty so far as to desire of her in writing her own observations of her malady, together with the alterations she hath found in her *pudendis;* which, not without much difficulty, she did send me yesterday after many importunities. I hope God will forgive me my curiosity, being chiefly led thereunto by an opinion, or secret impulse, that you, with the advice and information of what you may meet withal abroad, may be the author of her recovery. She says, in her own letter, to me thus: that she hath grown bigger and bigger this two years, as I told you before, and that her belly is constantly very hard; she did γυναικοθῆναι *hoc est per menstrua purgare more debito,* until the beginning of last summer, when she was advised to drink Epsom waters; which she did for some time, until she found great inconveniences by them, for ever since she hath had *suppressionem mensium;* and, moreover, presently after her coming from Epsom, she felt a thing come down just like a bladder, and bigger than her fist, and hath lain upon the neck of her womb ever since; and upon the least walking or straining comes out fuller, and when she lies down goes in further than a woman's reach; so are her own words. She saith she is free from any pain in those parts, only she hath a great weakness, so that she cannot stand much, especially after purging. Her navel is puffed up bigger than a little egg clear above the skin. She says that the doctors and midwives cannot determine what it is that comes down so; some say it is the mother. She saith, moreover, that she feels no pain either in her belly or back, only stitches fly up and down that are ready to take away her breath. She seldom or never breaks wind downward. This is all she tells me in her letter, and I do believe you have a larger account of her disease than her own physicians; her bashfulness is so much, that it will not suffer her to discourse with her own sex in this matter freely. I have most exactly, according to the meaning of her letter, transcribed her sense, and chiefly her words, where modesty will give me leave. I know I

need not provoke your diligence and industry in this matter to make all inquiries where you come after anything that may do her good. The compassion of your nature will prompt you to so charitable a work; she is a person of some quality, and I am sure will have a due sense of her obligations to you. The sickness last week at London was but 28, God be praised.

March 13th, 1663.

Mr. LISTER* to Mr. WRAY.

M. Lister D. Wray suo, S. D.

De Historiâ naturali Aristotelis ita censeo, eum hominem Philosophum præclarè agere; sed egregius vir minimè satisfacit tantis facultatibus atque adjumentis, quorum meminit Plinius ei præstita fuisse ab Alexandro. Certè in his præcipuè rebus, quibus me quotidie exerceo, turpissimè illum errare deprehendo, neque sanè id mirum cum præclarissimus author summum suum ingenium consulere maluit, quàm res ipsas. Illud manifestum, eum paucissimis experimentis fuisse contentum ut immensam structuram exædificaret. De Plinio tu mihi abundè satisfecisti superioribus tuis literis; adeoque tuum judicium à diligentissimâ lectione vehementer complector approboque. Ad nostros homines venio, quorum, in primis ingeniosissimus juxtà ac diligentissimus scriptor Aldrovandus (nam Albertum, Cardanum cæterosque id genus homines stomachor valdè, quòd me planè operam perdidisse sentio, quam iis evolvendis dederim; nisi quòd id profecerim, quàm licere homines doctissimos ineptire, qui ultra apparatum velint Philosophari). Sed ad Aldrovandum redeo, virum sanè mirificum, cui tamen ægrè fero istos locos suos communes; mallem equidem substituisset corollas de suo sequo dignas, sed id moris est hominum, immensam lectionem et industriam ostentare malumus, quàm

* Memorials, p. 17.

accuratissimè in paucis eisdemque nostris sapere: à quo tamen major fructus aliquando sperandus est in auxilium vitæ, ne dicam, nostræ laudis. Ante eum pro ratione temporum oportuit me dixisse de Whottono nostro, nisi quòd ab eo primò didici talem authorem extitisse. Elegantissimum suum opus tandem comparavi evolvique, is mirabili planè industriâ summoque ingenio usus est in extricandis veterum sententiis. Tabulas nostras ante confeci, quam eum nactus sum; at mireris, quantam voluptatem conceperim, cum eas contulerim cum differentiis Whottoni. Hunc excipiat Moufetus item noster, à quo omnia præclara et consummata quis non expectet, cui tanta adjumenta, tantaque nomina contribuerunt, Whottonus, Gesnerus, C. Clusius, Pennus, Knivettus, Bruærus, &c.? Profectò universum Theatrum suum adeo confusè et sine ordine condidit, ut quæ ei materies ab aliis, turpissimè collocator et minimè in laudem tantorum virorum. At non solùm ipsam rem ferè ignoravit, verùm etiam barbarè omnino exponit. Sed ea homini imperito et benè volenti condonare possimus, nisi alia planè res contrà suaderet, cui equidem in legendis autoribus multum tribuo studeoque, ut sc. intelligerem, qui sit eorum animus honestusne et probus. At ex ejus scriptis aliud apertè cognovi, quod satis mirari nequeo, arrogantiam sc. hominis, ne quid gravius dicam, qui cum infinita penè, præsertim de naturâ istorum minutorum animalium totidem ferè verbis transtulit ab Aldrovando, tamen nusquam ejus ingeniosissimi viri (si quis alius nostri seculi) mentionem facit. Ediderat autem Aldrovandus opus suum ante triginta annos quam hæc in lucem prolata sunt. Pauca ea, quæ de his rebus scripsere F. Imperatus, F. Columna tantis veris planè digna sunt, Moufeto ****** neminem legi præter Geodartium Batavum, cujus certè industria summè laudanda est. Nam præter elegantissimas figuras, quas appingi curavit, singulorum animalium cibatum, transmutationumque tempora, accuratissimè notat; ut tantùm apud eum desideretur eorum exacta descriptio; is autem præter nuda familiæ nomina ne verbum quidem

addit. Me olim judicium tuum elicuisse memini de Kerchero: is in tractatu, *mundus subterraneus* nominato, inter alia, de horum animalium productione spontaneâ pluribus verbis agit; quæ tamen res omnino an fiat in universâ rerum naturâ, dubito vehementer. Testimonia Aldrovandi, &c., nihili sunt. Ego plura expertus, quæ contrarium vel evincant, vel erroris certè causas declarent; quæ tu alio tempore, à me expectabis. In extremis ea accepi, quæ in actis illustrissimæ societatis vestræ lego. Ubi in primis præclarissimum specimen ingenii sui edidit D. King de Formicâ. Habes quæ scire potui de scriptoribus minutorum animalium, eâ judicii libertate, quæ nostræ amicitiæ sit. Si qui sint qui nostram cognitionem adhuc lateant, fac me de iis certiorem. Et velim ut tuum judicium interponas tum de his quorum suprà memini tum de iis quæ restant. Item rogo digneris quàm plurimis verbis mihi perscribere, quum, commodo tuo fiat, quid tu existimes de optimo genere harum rerum tum observandarum, tum tractandarum. Nam ferè totus sum in his novis nostris delectationibus. Vale et nos ama.

Burvelæ agri Lincolniensis, viii Cal. Aprilis.

Mr. Wray to Mr. Lister, Fellow of St. John's College, Cambridge.

Sir,—Arrived here (viz. Cambridge) I found a letter from you, the reading whereof gave me no small content, it containing expressions so significant, and full of heat and πάθος, as certainly nothing but sincere love could dictate. Sure they must needs be a true copy of your mind, and not words of course and compliment, only I could wish you had been more sparing in what refers to my commendation; for though I would not refuse the testimony and praise of persons who are themselves praise-worthy, where there is just ground and reason for it, yet not when it exceeds the merit of any thing I dare

own, nor for such qualities as I am not conscious to myself of, which gross self-flattery must needs much blind me if I did not quickly discern to proceed rather from affection than judgment. I rejoice much that you still pursue the study of nature, not only because of the propensity I myself have to it,—and consequently to love such as agree with me,—but also because I judge you to be a person, to speak modestly, as well qualified as any I know in England for such an undertaking, and so likely to make the greatest advance and improvement, you having taken the right course and method; that is, to see with your own eyes, not relying lazily on the dictates of any master but yourself, comparing things with books, and so learning as much as can be known of them. I do not wonder a man so inquisitive should make some additions to the Cambridge Catalogue. *Hieracium rectum rigidum,** it is not unlikely you might find about Burwell; but it seems somewhat strange you should there meet with *Alchimilla vulgaris*, I having not to my remembrance ever met with it in England elsewhere than in mountainous places, as Westmoreland, Wales, Derby, York, Staffordshire, &c.

Those remarks you mention you would oblige me much to communicate, I being very fond of seeing any of your productions.

I was much pleased to understand that you do not confine your studies and inquiries to Phytology only, but take in Zoology, and the whole latitude of natural history. Lincolnshire, for fish and fowl, affords you a large field, yet it is very much that in one winter you should meet with upwards of fifty species; and I wish I had the sight of your descriptions, which I doubt not to be very exact; but because they cannot easily be transmitted, I shall only desire a catalogue of their names, that so I may know what there are I have not yet met with.

Middleton, June 18, 1667.

* It is probably *Hieracium umbellatum*, Linn.

Mr. Lister to Mr. Wray.

M. Lister D. Wray S.

Pridie vesperi insectum animal admodum lucens in aëre vidi, cepi, notavi, scripsi. Ratione lucis Cicindela meritò appellanda est: sin autem propiùs et claro sole animalculum perspexeris, Scarabæorum tribu familiâque esse diceres. Corpore erat parvo, longiusculo, tenui, æqualitèr lato; quoad superficiem, lævi planoque; quoad colorem, alas, alarumque thecas, caput, fusco aut pullo. Tegumentum capitis clypeum inversum lepidè imitabatur. Caput subtèr, ratione et operculi sui, et corporis, minimum erat (atque hinc tegumentum ejus ad latera sua perspicuum), à duobus nigerrimis splendentibusque oculis dispartitum. Caput duæ brevissimæ tenuissimæque Antennæ ornabant. Humeri nulli: nam suprà, tegumento tantùm, alarúmque thecis, destinguebatur animalculi corpus: subter, aliter res se habet. Tres pedum tenuissimorum ordines, ad fabricam et similitudinem vulgaris muscæ nigræ facti: quorum duo mox infra caput rubenti collo inserebantur. Tumet thorax, rotundus, lævis, splendens; cujus basi alterum pedum par adhærent. Denique venter sex annulis imbricatim venustissimè dispositis constabat: quorum ultimis iste liquor bipartitus ad instar aquæ marinæ lucens micánsque inerat. De die caput sursum tollere gaudet: lentè et rarò se loco movet: Utrumque more Bufonis. Vale.

Col. Divi Johannis, 6 Cal. Julii, 1667.

Mr. Dent to Mr. Wray.

Sir,—Mr. Mayfeild could not procure any dried *Mayds* or *Thornback* at the mart. He helped me to a fresh *Thornback*, which he said was full grown: its weight was ten pounds. It was female, and had very many

eggs in it, all exactly round, of different bigness; the largest as big as a little May cherry, paler coloured than a hen's egg, of that bigness, otherwise not different to the eye. I have dried the fish a little with salt, &c., yet not so much but that it will recover its form if soaked in hot water. The tail (a foot long) was cut off (as usually) when caught, which, they say, was full of pricks, both above and below, to the very end. *Maydes*,* they say, are of two sorts, the larger sort (much smaller than *Thornbacks*) properly called *Flayre Maydes*†—smooth as flayre, pale coloured, not dappled or waived; the less called *Thornback Maydes*, full of pricks, dappled, but paler coloured than the *Thornback*. It seems a full-grown *Flayre* is a very large fish. Mr. Mayfeild told me he sold one to the cook of St. John's College of two hundred weight and upwards, and that it served all the scholars of the college at that time, being thirty mess for Commons; which was likewise confirmed to me by the cook of the same college. There are male and female of all these four sorts. I cannot understand that these four do differ at all in shape of body, but only in proportion, colour, and smoothness of skin or prickles. With the fish I have put up in a box some water-fowl, viz., a Pocker [*Fuligula ferina*], a Smew [*Mergus albellus*], three Sheldins [*Tadorna vulpanser*], a Widgeon and a Whewer [*Anas penelope*]; which last two are male and female of the same kind. Widgeon is never applied to the female sex. It is usual to call a silly fellow a *wise widgeon;* or to say, he is *as wise as a widgeon;* and a drunkard's song saith that

> "Mahomet was no divine, but a senseless widgeon,
> To forbid the use of wine unto those of his religion."

It is usual to say of one of a large size, "Sure the dam of that was a Whewer." We could not meet as yet with a Pintayle [*Anas acuta*]. My cousin tells me it is some-

* [Young females of the Thornback Ray (*Raïa clavata*) are so called.]
† [The females of the Fire Flayre, or Sting Ray (*Trygon pastinaca*).]

what less than a Whewer, of lighter gray colour, the wings and tail longer and sharper pointed, the bill longer and narrower. I have put up some hollow bones which are annexed to the windpipe of each male; for in females I can find none otherwise than you will find in the paper writ upon Whewer. The difference of shape of these bones, doubtless, causes their different tones. If you steep one of the Sheldin's windpipes a while in warm water to make it lax, you may observe the pretty motion to be found in the middle protuberance, and pick out a little philosophy from it. Whenever I find any farther opportunities of serving you, I will approve myself, &c.

Cambridge, Feb. 15, 1674.

Mr. LISTER to Mr. WRAY.

M. Lister D. Wray, suo S.

DE Valetudine tuâ incommodâ vehementèr movebar. Etenim cùm summam tuam temperantiam atque abstinentiam tàm probè scirem, omnia de te pejora metui. Idque eâ de causâ loquor, quòd mihi non parùm errare de victûs ratione videbaris. Is quantum meminerim (téque in eâ re, cùm Monspelii ad eandem mensam diù hospites unà fuerimus religiosè observavi) parcissimus, scrupulosissimus. Accedit illud tibi, jejunia frequentia, longissima: et ut pauci cibi es, ita et rarissimi corporis habitûs.

x. Cal. October, 1667.

Mr. WRAY to Mr. LISTER, in answer to the preceding Letter.

J. Wray D. Martino Lister, suo S. D.

SYMPTOMA illud de quo non ita pridem apud te conquestus sum (Deo gratias) non ingravescit sed remittit potiùs: me tamen ab eo penitùs liberatum iri vix est ut sperem, adeò teneri sunt (ut nôsti) et putredini obnoxii

pulmoñes, ut siquam semel labem contraxerint, difficulter admodum in integrum restitui et percurari possint. Quòd me in victûs ratione (quam justo tenuiorem instituere putas) errare, eíque rei partem aliquam mali quocum conflictor imputandam censere videris, ignoscas si sententiæ tuæ non accedam. Absit ergo ut ego temperantiæ laudem, quæ mihi nulla debetur, affectem, aut delatam ultro amplectar. Reliqua quidem animalia rationis (ut vulgò creditur) expertia, quæ secundùm naturæ præscriptum et instinctum degunt, et alimenta nullâ arte præparata, qualia natura iis subministrat accipiunt, in cibo capiendo nec legem observant, nec modum tenent, nec statis temporibus vescuntur. Verùm cibus quo illa utuntur, et excrementi multi est, et succi pauci, unde et illum sine errore aliquo aut noxâ insigni copiosiùs ingerere possunt. Deinde quoniam parcâ manu, sponte suâ, nullo culturæ mangonio stuprata illum suppeditat alma tellus, multùm se exerceant oportet, multumque temporis impendant in illo conquirendo; unde nec si velint in excessu facilè peccare possunt. Hinc feræ et sylvestres animantes rarò ultra modum pinguescunt, nec admodum libidine turgent, sed statis duntaxat temporibus, semel ut plurimùm in anno ad Venerem incitantur; suntque admodum vivaces, et morborum plerunque expertes. Nos certè (me judice) valetudini nostræ meliùs consuleremus, si illorum exemplo, victu simpliciori et viliori uteremur, iísque cibis quibus ventriculum implere modicéque distendere fas esset. Quòd Gesnerum et Aldrovandum consulueris, et eorum descriptiones cum tuis diligenter contuleris, rectè et ex ordine mihi fecisse videris; paucissimas certè Aves invenies quæ illorum diligentiam effugerint.

Dabam Notleiæ Cal., Octob., 1667.

Mr. WRAY to Mr. LISTER.

Joannes Wray D. Martino Lister, suo S. P. D.

Quòd Veteres Latinos Medicos pervolvere in animo tibi esse scribis, mihi admodum probatur; namque siquid ego judicio valeo, iis legendis plurimùm proficies, magnúmque operæ-prætium facies. Cornelium Celsum et ipse legi. Est ille optimus Latinitatis autor et Medicinæ veteris satìs gnarus, quamvis ipse (ni malè memini) professione et usu medicus non fuerit. Scribonius mihi nunquam lectus est, Plinium secundum summi ingenii virum tibi commendare (quem nemo sc. vituperat) superfluum et ineptum foret. Est autem ipsius opus nihil aliud quàm Pandectæ, in quas congessit quicquid uspiam apud Veteres seu Græcos, seu Latinos exterósve legenti occurrebant argumento suo convenientia, temerè et sine delectu, nullóque judicio adhibito. Plurimum certè illius industriæ debemus, qui è monumentis Antiquorum plurima ad historiam naturalem pertinentia commentariis suis inserendo ad nos derivavit, quæ aliter injuriâ temporum cum Autoribus suis penitùs intercidissent. Nec tamen meritò vituperandus est, quòd nullo discrimine verà falsis admiscet; liberum enim unicuique judicium relinquit; finem suum assecutus, quòd omnia quæcunque à Græcis aliísve literis prodita invenerit sine invidiâ Romanis suis communicârit. Video te Romanarum Antiquitatum scriptores et vindices præ manibus habere: Plurimos ejus generis Autores vidi: quem cui præferam non video. Inter alios J. Lipsius præcipuam laudem meretur, qui de militiâ Romanâ, de gladiatoribus, de Amphitheatris, etc. fusè tractavit, additis etiam ad majorem illustrationem figuris æneis. Est et Casalius quidam Romanus qui de profanis Gentilium ritibus copiosè egit, adhibitis etiam iconibus. In hoc libro quæ ad sacrificia pertinent, vasa, instrumenta, et reliquus omnis apparatus, traduntur. Est et Tomasinus quidam Italus qui de annulis antiquis, de Tesseris Hospitalitatis aliísque quibusdam tractatus edidit. Lazarus Bayfius olim de re Vestiariâ et Navali

scripsit, at breviter. Urbis antiquæ situm et monumenta, quorum partes aliquæ vel rudera etiamnum supersunt, nimirum templa, porticus, amphitheatra, balnea, obeliscos, columnas, aquæductus, circos, etc.; delincârunt et descripserunt plurimi, at Italicè plerique. Quo ego usus sum liber 2bus parvis octavi folii tomis comprehensus, *Roma antica e moderna* titulum habet: quem quia viliori pretio parabilis est, tibi etiam commendo, ut qui linguam Italicam probè calleas. Figuras quamvis in minori formâ non inelegantes rerum præcipuarum de quibus tractat inibi reperies. Sed manum de tabulâ, de his aliisque si opus sit plura cùm Londini fuero; interim vale et me ama.

Dabam Notitiæ iv. Idus 8bris, 1667.

Mr. WRAY to Mr. LISTER, at St. John's, Cambridge.

J. Wray, D. Martino Lister, S. D.

LITERAS tuas iv Id. Novemb. ad me datas non sine tacitâ quâdam admiratione legi; adeò eruditæ mihi visæ sunt, adeò eleganter et ad amussim scriptæ. Felicem me qui talem amicum habeam et studiorum æmulum, maximo mihi adjumento futurum, et Reip. literariæ ornamento. Quid enim de te sperare nefas? qui tantos jamjam in bonis artibus et literis progressus feceris, atque in id fastigium evaseris, sive rarâ quâdam ingenii felicitate, sive studio et industriâ, quò studiosorum vulgus maximâ contentione nequicquam anhelat. Rem sanè difficillimam planè consecutus es, ornatè dicendi scribendique facultatem; adeò ut de Latini sermonis puritate, déque stylo expoliendo tibi ampliùs laborandum non sit, cùm in his tantopere excellas aliisque æqualibus tuis palmam facilè præripias. Hanc mihi confessionem res ipsa extorquet; hanc tibi debitam laudem ni tribuam, invidus censeri debeam et amici titulo indignus. Dominum Willughby non est cur tibi conciliare studeam, cum bonos omnes et eru-

ditos tuique similes sponte suâ amplectatur, omnibúsque officiis demereri sibíque devincire gestiat. Scribonium ut legere aveam commendatio tua effecit. Verùm liber ille non ubique est obvius, aut paratu facilis. Cùm primum mihi ejus copia facta fuerit, lectionem aggrediar. Dubia illa quæ tibi occurrunt, et legentem morantur, næ erras vehementer, si me posse solvere tibique eximere putas. Quid sibi velit autor ille cùm *Hypocistidem* definit Rosæ sylvestris succum, etc., divinare non possum. Bauhinus noster aliique Botanici *Cistum* fruticem ob floris cognationem juxta Rosam collocant; nemo tamen Rosam caninam appellat; ni fortè pro *caninâ*, *marina* substitui debeat. Nam Cæsalpinus, ut citatur à J. Bauhino, *Cistum* quondam *Rosam marinam* appellari scribit. At nè sic quidem rem expediemus, cùm Hypocistis non ipsius Cisti succus sit, sed plantulæ cisti radicibus adnatæ, quæ Hypocistis dicitur. Pro Oxytriphyllo Scribonii aliam longè diversam plantam nobis exhibent Lobelius et Clusius, magna nomina, nimirum *Lotum pentaphyllon siliquosum villosum*, C. B. [*Lotus hirsutus*, Linn.], ut apud eum in Pinace videre est: utcunque ego judicio tuo plurimum tribuo, tuámque sententiam probabilem existimo, quoniam illud facultate aliquâ insigni pollere vel bituminosus odor satìs arguit, quum in hoc nec odorem nec saporem aliquem excellentem observaverim. *Opium* quin præstantissimum sit medicamentum, præsertim extrinsecus adhibitum, nullus dubito, in eo tamen intus sumendo summopere cavendum est nè erres, aut modum excedas; nam ex frequentiori Opii usu, quantumvis optimè præparati, funesta tandem symptomata consecuta esse tristi multorum experimento satìs constat. Quòd in omni sanguinis eruptione artus constringi verat, utris similitudine deceptus errare videtur. Quòd verò per venam, animalis arteriam intelligat, verisimile est, quoniam Romani tum Venas tum Arterias communi nomine Venas dixerunt: nec in vasis hisce distinguendis curiosi fuere, tantùm abest ut circuitum sanguinis illos vel per nebulam vidisse concesserim. De

Fungis cùm te, Deo dante, videro, pluribus agemus. Quòd in studiis rei naturalis tam constanter perseveres, et institutum pertinaciter urgeas, te plurimùm laudo. Rem sanè curiosissimam te nuper observâsse narras, nimirum *Cochleam* cujus spiræ in diversam partem flectantur, cùm inter doctos constans opinio sit, à septentrionali æquatoris parte cochleas omnes (motum sc. solis observando) à sinistrâ dextram versùs torqueri. Nec ego unquam inveni qualem tu describis. Sive ergo aliæ sint hujus generis, sive hæc sola exceptio sit, et diligenter servari, et exactè describi, depingique meretur. Ni mora in hâc urbe mea incerta fuisset à te illam petiissem, ut Regali Societati (cujus nuper particeps factus sum) monstrarem. Die Lunæ proximo (favente numine) Sussexiam petam Londino relicto, ubi vanis pollicitationibus nimis diu detentus fui.

Londini ix Cal. Decembr., 1667.

Sir PHIL. SKIPPON to Mr. WRAY.

SIR,—The dean (Wilkins) says he is confident no man can translate his book, 'Real Character,' better than yourself. Yesterday the transfusion of blood was experimented upon the same body they hired at first: they let out eight or ten ounces of his own, and then transfused of the sheep's arterial blood about fourteen or sixteen ounces. There was a great company present. The sweet-smelling earth found in Captain Massey's garden in Hogston, you have heard of already; an oil has been extracted which smells sweet. The 'Journal des Sçavans' relates, that Cassini hath discovered and described the motions of Venus about her own axis.

Dec. 13, 1667.

Sir PHIL. SKIPPON to Mr. WRAY.

SIR,—The effects of the transfusion are not seen, the coffee-houses having endeavoured to debauch the fellow, and so consequently discredit the Royal Society, and make the experiment ridiculous.

Sir PHIL. SKIPPON to Mr. WRAY.

SIR,—Yesterday there was a letter read from Dr. Sampson (who is at Leyden) to Dr. King, giving some notable observations in the anatomy of a . . . . near the Bodensee. Dr. Lower showed the cause of blindness in horses, which is a spongy excrescency that grows in one, sometimes in two or three places of the uvea; which, being overgrown, covers the pupil when the horse is brought into the light, but in a dark stable it dilates again. A trial was made, whether a piece of iron touched by a magnet would weigh more than it did before it was touched: this succeeded not. A present was sent from Mr. Colpresse, I think, who lives in the West, being a box full of the several mineral stones, clays, &c., observed there. Mr. Hooke has improved the pendulum watch, by making the simple vibrations promote the circular motion. It is hoped the college they have designed below Arundel House, towards the water-side, will be finished by next Michaelmas. Dr. Moulin translates the 'History of the Royal Society' into French.

London, Jan. 24, 1667.

Sir PHIL. SKIPPON to Mr. WRAY.

SIR,—It is somewhat difficult for me to explain in writing the new way of pendulum. There is the common vibration that Hugenius invented in watches, and Mr.

Hooke hath to that added a circular motion; the weight at the end of one vibration is turned off by a kind of a spring, which makes the motion circular. The most considerable experiment yesterday, was the weighing of 1st, tin; 2d, copper; 3d, tin and copper equally mixed together: these three severally were of the same weight in the air, but in water the mixed metal weighed much lighter than the other two. A new book of Dr. H. Moor is come out, which he calls 'Enchiridion Ethicum.'

Feb. 21, 1667.

Mr. WRAY to Mr. LISTER, at Burwell in Lincolnshire.

Jo. Wray D. Martino Lister, suo S. D.

SENTENTIAM tuam de autoribus iis qui de Insectis commentati sunt, in plerisque probo. Aristoteles quamvis egregius autor, confusus esse videtur aliquando et obscurus, et in quamplurimis à scopo aberrat. Qui tamen supersunt historiæ animalium libri non sunt integrum Aristotelis de hâc materiâ opus. Cùm Plinius (ni malè memini) quinquaginta voluminum meminit. De Aldrovando, Alberto, Cardano, juxtà tecum sentio. In Wottoni opere non admodum versatus sum; video tamen illum ex antiquorum scriptis hausisse quicquid ferè in illud volumen contulerit. In Mouffetum nimis iniquus videris: nam et ille, me judice, non malè meruit de repub. literariâ, et pleriq. viri docti mihi suffragantur. Goedartium mihi nondum videre contigit. Kircheri judicium nihili facio; an verò Insecta quædam spontè oriantur nécne, determinare nequeo. Præter hos qui de insectis scripserunt, alicujus nominis aut pretii nullos novi: vidi aliquando in Siciliâ opus manuscriptum D. Castelli Romani in duos tomos divisum. Volumen satìs spissum et grande cum figuris propriâ ipsius manu delineatis, quod nescio an unquam lucem publicam visurum sit.

Londini. xiii Kal. Maii, 1668.

BOMBAY BRANCH OF THE ASIATIC SOCIETY

Mr. WRAY to Mr. LISTER at Cambridge.

J. Wray D. Martino Lister, suo S. D.

PROXIMA statio fuit Sheffeldia in comitatu Eboracensi. Ibi à vetere amico D. Jessop perbenevolè exceptus sum, in cujus ædibus etiamnum diversor. Quid tibi inquies illic negotii. Dicam quod res est. Scis me Phytologiæ studio deditum esse, et catalogum Angliæ indigenarum stirpium jamdudum meditari, quem ut tandem absolutum et omnibus suis numeris perfectum reddam, nullis laboribus parco, quin quotannis æstivis mensibus profectiones longinquas, etiam in remotissimas hujus regni provincias suscipio, quatenus facultates suppetunt, ad plantas indagandas. Hâc æstate Australes Eboracensis provinciæ tractus et Westmorlandiam mihi lustrandas proposui, quod et jam feci, duabus in eo itinere consumptis septimanis. Nondum tamen, quod dolet, incidi in quasdam stirpes, quas in iis regionibus spontè provenire certa fides mihi facta est. Ea sunt, Bistorta minor [*Polygonum viviparum*, Linn.], Christophoriana [*Actæa spicata*, Linn.], pyrola [*Trientalis europæa*, Linn.], Alsines flore europæa, Calceolus Mariæ [*Cypripedium Calceolus*, Linn.], Thlaspi Globulariæ folio, J. B. [*Th. alpestre*, Linn], alliæq. unde nec mihi adhuc penitùs satisfactum est. Hinc ego in Sheffeldiâ, ubi ad æquinoctium usq. manere in animo habeo.

Dabam Sheffeldiæ ex æd. D. Jessopp Broomhall dictis 7 Kal. Augusti, 1668, i. e. 26 Jul.

MR. WRAY to Mr. LISTER.

J. Wray D. Martino Lister, suo S. D.

EGO, ex quo huc veni, partim Physicis, partim Mathematicis studiis memet exercui; siquidem D. Jessop mathematicis imprimis delectatur, in quibus non contemnendos sanè progressus fecit. Quo consilio hoc iter

susceperim tibi (ni malè memini) antea aperui; et res sanè ex voto cecidit, quamvis nondum penitùs institutum absolverim, aut invenerim omnes quas quæsiverim plantas, quasque in septentrionalibus hisce regionibus provenire certa fides mihi facta est. Quænam inquies sunt illæ? Androsace altera Matthioli minor, Valeriana græca [*Polemonium cæruleum*, Linn.], Thlaspi Globulariæ folio, J. B. [*Th. alpestre*, Linn.]. Pyrola Alsines flore europæa [*Trientalis europæa*, Linn.], Polygonatum baccâ nigrâ simplici, flore unico fimbriato viridi, D. Merret [*Convallaria Polygonatum*, Linn.]. Bistorta minor [*Polygonum viviparum*, Linn.], a sort of Nasturtiam folio tenuiter dissecto, &c. Cùm verò tot adhuc species exquirendæ supersint, ne me nihil omninò egisse, aut nequicquam hoc itinere profecisse suspiceris; adjiciam earum nomina quæ mihi noviter hâc primùm æstate observatæ sunt. Sedum ericoides, J. B. [*Saxifraga oppositifolia*, Linn.], in summitate montis Ingleborough. Bursæ pastoris loculo oblongo affinis, pulchra planta, J. B. [*Thlaspi alpestre*, Linn.], in Montosis circa Settle et Ingleborough et alibi in regiunculâ Eboracensi Craven dictâ. Gallium cruciatum, J. B. [*G. cruciatum*, Linn.], in Westmorlandiâ prope Orton et alibi. Filix pumila saxatilis 2a *Clus.** ibidem in muris et locis ruderatis: Cratæogono Euphrosynes facie similis n. d. quod sciam, propè Orton. Sedi aut Cotyledonis nova species in rupibus Wrenose. Descripsi præterea accuratiùs alias aliquam multas quas olim inveneram, nimirum Filicem quandam Petræam crispam elegantem, sive Adianthum album floridum mihi dictum [*Pteris crispa*, Sw.]; Sedum alpinum angustifolium luteum [*Saxifraga aizoides*, Linn.]; Sideritidem hirsutam arvensem [*Galeopsis ochroleuca*, Lam.]; Geranium Batrachoides alterum fusco simile [*G. sylvaticum*, Linn.]; Rosam pomiferam fructu spinoso majorem [probably *Rosa villosa*, Linn.]. Ostensa insuper mihi sunt ab aliis, Meum vulgare [*Meum athamanticum*, Linn.] in Westmorlandia, viâ inter Sedberg et Orton, magnâ in copiâ; Christophoriana [*Actæa*

* See Sm. Eng. Fl. iv. 293.

spicata, Linn.], in Sylvis Haselwood Eboracens. Pyrola vulgaris [*P. rotundifolia*, Linn.] ibidem. Helleborine flore atro-rubente [*Epipactis ovalis*, Bab.] variis in locis. Bistorta major vulgaris [*Polygonum Bistorta*, Linn.] hic passim provenit in pascuis: Omitto Padum Theophrasti [*Prunus Padus*, Linn.]; Paralysin Alpinam Birdseyn dictam [*Primula farinosa*, Linn.]; Salicem folio laureo sive lato glabro odorato [*Salix pentandra*, Linn.]; Vaccinia nubis [*Rubus Chamæmorus*, Linn.] quæ copiosè collegi in monte Hincklehaugh propè Settle; Pneumonanthen [*Gentiana Pneumonanthe*, Linn.], quæ in agro etiam Lincolniensi abundat: Quatuor Musci clavati varietates, scil. Lycopodium, Sabinam sylvestrem Tragi, seu Muscum clavatum foliis cupressis; Chamapeucen Turneri, seu Muscum clavatum abietiformem, Muscum fortè terrestrem erectum, J. B., et tandem Muscum partim erectum, partim repentem: Cirsium Britannicum repens Clus, J. B. [*Carduus heterophyllus*, Linn.]. Ranunculum globosum [*Trollius europæus*, Linn.]: Sedum minimum [*Sedum anglicum*, Huds.] flore albo: Mercurialem sylv. *noli-me-tangere* dictam [*Impatiens noli-me-tangere*, Linn.]; Trachelium majus Belgarum [*Campanula latifolia*, Linn.], aliásq. quæ in his partibus satis frequentes sunt, alibi quod sciam in Angliâ nusquam proveniunt. Quamvis verò plantis indagandis hoc iter præcipuè destinaverim, alias tamen historiæ naturalis partes non omninò neglexi. In historiâ quidem Piscium nihil promovi: Avium vero 4 aut 5 species mihi oblatæ sunt non antea visæ, nimirum Grygallus major Gesneri, quem Francolinum Itali vocant, in montibus ericosis frequens, *Red Moregame* Venatores et Rustici vocant. Non me latet Gesnerum Francolinum Italorum Gallinam corylorum dictam existimare. Ego avem hanc eandem esse puto ei quam D. Thomas Crew Monspelii pictam nobis ostendebat, cujus appellationem Gallicam oblitus sum. Merula saxatilis seu montana, à Torquatâ dicta (ut mihi videtur), omninò diversa; Merula aquatica et Caprimulgus; Aviculorum quoq. duæ aut tres species,

quæ nescio an, aut quibus nominibus descriptæ sunt. Vin' ut observationes meas de Insectis tibi communicem; quasi verò eæ diligentiam tuam effugissent. Age, nè me in hâc incultâ, fœcundissimâ tamen Philosophiæ naturalis parte nihil studii aut operæ collocâsse existimes, non pigebit eas adscribere quamvis tibi fortasse notissimas: In summitate montis oppido Settle imminentis, Apem sylvestrem observavi, cujus alæ cinereæ ductu nigro transverso insignes fuere. Aliam præterea Apem sylvestrem ex Eulâ in lasano seu latrinâ generatam aculeo carentem, aliàs api domesticæ non absimilem. Est autem Eula hæc (seu Vermiculum mavis dicere) sordidè alba, oblonga, caudâ tenui productâ: duas insuper Apum sylvestrium species, quæ in parietibus antiquis ex luto compositis nidificant, in agro præcipuè Northamptoniensi. Verùm antequam apes dimittam, de Fucis tibi respondebo. Mihi equidem nullo meo experimento constat Mares eos esse. Verùm quoniam Butlerus aliiq. qui Apum historiam summâ cum diligentiâ tradiderunt, id asserant, nos quoq. receptæ sententiæ tantisper adhærendum censuimus, donec falsitatis convinceretur. Formicæ si eas irritaveris (de majoribus *Horse Ants* dictis intellige), earum cumulos baculo agitando, liquorem quendam acetosum ejicient in baculum, qui naribus admotus eas vehementiùs ferit quàm acetum. Si iratam Formicam cuti admoveas eam rostello primùm perforat, deinde caudâ obversâ liquorem hunc orificio instillat, qui pruritum et dolorem excitat. Hujus rei experimentum ego nondum feci, ab amico tamen fide dignissimo accepi, nec de eâ dubito, præsertim cum liquorem dictum adeo acrem senserim.

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Vale iv Idus Septemb. 1668, i. e. Sept. 10.

Mr. WRAY to Mr. LISTER.

Joannes Wray D. Martino Lister, S. D.

LITERAS tuas et novissimas et superiores accepi, quibus Araneorum 30 à te nuper observatorum nomenclaturas inseruisti. Miror sanè quâ arte et industriâ usus, tam brevi temporis spatio, tam angustis loci limitibus tot distinctas species investigare potueris. At verò satìs mirari nequeo, unde tibi tantum otii tam alieno tempore cum curis et solicitudinibus variis perturbatus huc illuc fluctuaret animus, nec sui juris esset, ut possit cuiquam studio se totum impendere. Ego equidem (ut verum fatear) in Araneis inquirendis et contemplandis minùs diligens et industrius fui, partim quòd aliis studiis et negotiis impeditus iis attendere non vacaret; partim quoniam ob veneni suspicionem vix tractabiles sint hæ bestiolæ, mihi præsertim, qui ab ineunte ætate vulgari præjudicio abreptus, ab iis nonnihil etiamnum abhorream. Ast quamvis Araneorum historiæ parum peritus sim, duo tamen habeo, de quibus te consulendum censeo. Alterum occurrit (ni malè memini, nam liber ad manum non est) in Micrographiâ dictâ D. Hook, estque historiola perquam lepida de areneâ venatrice et insidiatrice, quam à se visam autori communicavit D. Evelyn, vide sis librum ipsum, ego enim memoriæ meæ non satìs fido, ut eam referre ausim. Nunquid simile à te unquam observatum fuerit scire aveo; nam et tu quoque in titulis ad me transmissis Araneæ saltatricis unius et alterius meministi. Alterum ab amico fide dignissimo mihi communicatum fuit, à se sæpius spectatum. Nimirum quòd Aranei nonnulli telas suas non extrahant tantùm et eliciant ut moris est, sed protrudant et quasi projiciant ad distantiam notabilem, projiciunt inquam, *i. e.* prorsum ejaculantur obliquè, et ad latus, et non tantùm demittunt rectà deorsum, nam et hoc ab aliis observatum nobis antea innotuit. Quomodo illud fieri possit, quum filum non rigidum

sit baculi ad instar sed tenuissimum et ut puto molle, non satis perspicio. At ille nullus dubitavit se rem ipsam mihi brevi monstraturum, ut oculis saltem meis si minùs ipsius sermoni crederem, quod et effecisset, ni mihi occupato res memoriâ excidisset. Superest jam ut tu rem penitùs conficias, et omnem mihi scrupulum eximas. Alia Insectorum genera non omninò neglexi κουλεόπτερα et ἀνέλυτρα· at verò cùm Ds. Willughby iis conquirendis, examinandis, describendis, conferendis sedulam à multis retro annis navavit operam, ego obiter tantùm et animi causâ hâc in parte versatus sum. Age tu, procedas bonis avibus, habes quem æmuleris. Non deerit utrique vestrûm materia in quâ ingenia exerceatis. Latissimus patet campus à nemine antea occupatus, nullius pede tritus. Naturæ divitiæ planè sunt inexhaustæ, nec cuiquam post mille secula nato deerit quod scrutetur, et in quo se cum laude exerceat. Hippocrati viro summo qui jamdudum in medicinâ principatum tenuit, detractum nollem, quem Spagyrici etiam mirantur, in primis Helmontius tuus, dum rarissimi doni virum et Adeptorum participem eum appellat. Libros ὑπιδημιῶν nunquam legi, nec alios quàm aphorismorum, in quibus ego nonnulla observavi quæ mihi aut falsa aut cum ratione minùs conjuncta visa sunt. Verùm de his fortasse aliâ vice. D. Wilkins in episcopalem cathedram evectum, et sui-ipsius, et mei, et præcipuè ecclesiæ causâ vehementer gaudeo. Me tamen per eum ecclesiæ restitutum iri, stante sententiâ, planè est impossibile, nec enim unquam adduci me posse puto ut declarationi subscribam quam lex non ita pridem lata presbyteris aliisque ecclesiæ ministris injungit, nec tamen tanti est jactura mei qui nulli fere usui ecclesiæ futurus essem, utut (quod dici solet) rectus in curiâ starem.****

Prid. Kal. ixbris Dabam Notleiæ, i. e. Oct. 31.

Mr. LISTER to Mr. Ray.

M. L. D. Johanni Wray, suo S. D.

QUÒD tibi otium nostrum probavimus, vehementer gaudeo. At quid in me quæris præcipuam artem, cujus tu non et author et præmonstrator fueris! Aranearum nudi Tituli tibi arrisêre: neque dubito, quin integræ earum historiæ magis placuissent, ita res planè novas observavimus. Sed librum mutilare nolui, in quo nomen tuum amicitiæ nostræ ergo inscripseram, neque in præsentia alia transcribam, quàm quæ à me quæris. Itaque scito in Micrographiâ D. Hook duas Araneas nostras perstringi, quarum nomina habes, nimirum unam *Araneum rufam non cristatam*, etc., alteramque de quâ quæris, *saltatricem cineream*, etc., atque hâc etiam in nostrâ insulâ frequentissima est, apertoque marte venatur solertissima bestiola, ejusque venationis modum elegantissimis verissimisque verbis enarravit D. Evelyn noster. Quòd autem ego istam ejaculationem fili non ignoraveram, tibi abundè testetur Aranea volucris nostra, imò verò ferè omnes, quibus est materia ad fila remittenda, idem planè factitant; sed eâ præcipuè delectari videtur, quam ideo *volucrem* appellavi an quòd in eâ hanc rem primùm notavi. Ast ipsam rem à principio audi; profectò si mecum fuisses mense Septembri jucundissimo spectaculo te beâssem. Nam possis meminisse tum plures serenissimos dies continenter illuxisse, quales tu et ego toties admirati sumus in illâ felici Galliâ Narbonensi. Ego, inquam, tum temporis Araneas conquirendo, mirificas illas telas cœlitùs delapsas propius considerare volui, in quibus pertractandis fortè incidi in hanc Araneam, mihi nunquam antea visam. Hâc ego novitate mirè commotus, alias illico telas intercipio, aliasque easdem Araneas itidem notavi. Atqui ne adhuc quidem suspicari potui, eam tot tantarumque telarum authorem fuisse. Fortè in diebus paucis dum attendo artificio aliarum mihi notissimarum Aranearum, subitè ab instituto destitit ea quam

contemplatus sum, atque resupinata anum in ventum dedit, filumque ejaculata est quo planè modo robustissimus juvenis è distentissimâ vesicâ urinam. Miror inusitatum morem bestiolæ, videoque jam filum in plures ulnas remissum fluctuansque in aëre; mox verò insiluit ipsa bestiola, eoque rapiebatur, quo ducebat filum ano etiamnum firmitèr adhærens, supraque non nimium humiles arbores evecta est. Ego lætus alias quæro, eandemque rem mihi postea confirmârunt infinita penè experimenta. Atque illud quoque ab assiduâ observatione huc accedit, quòd penè incredibile est, rem tamen planè conficit, nimirum dum ita volant, prioribus pedibus celerrimè circumactis, id omne longissimum filum ad se retrahunt, inque glomerem aut floccos implicant, subinde nova ob vecturam fila sufficiendo remittendoque. Tantam ego nec jam copiam miror hujusmodi telarum, cum tot earum authores sint; nec modum fiendi, quem tibi satìs, ut puto, exposui; nec materiam cum hæ telæ planè eædem sint quæ cæteræ domesticæ. Unum illud est de quo dubites, has telas paulo teneriores esse, at tu cogites velim calorem solis, et si ita minùs credas, fac experimentum ad ignem an recens tela aut fortassè vetus macerata non in eandem planè albedinem teneritudinemque coquatur. Sed de his hactenus; alia plura huc pertinentia, si rem fortasse jam minus illustraverim, tuque ea desideres, libentèr expediam communicaboque. Cochleæ, quas superiori anno observaveram, spiris è dextrâ in sinistram tortis tibi visæ sunt res dignæ notitiâ vestri amplissimi collegii. Certè scio non parvi facies originem harum telarum, de quibus quantas nugas apud scriptores etiam recentissimos! ut aliquando homines etiam naturæ liberæ, cum eam satìs jam vexent, diligentèr attendant. Nam video somnia vulgò philosophantium jam diu plane exolescere. De Formicarum aculeo, nihil mihi rescribis, cujus tamen, quod scio, nemo hactenus vel levissimam mentionem fecit. ****

Mr. Jessop to Mr. Wray.

Sir,—I have done the most part of that you enjoined me. I have stuffed the skins of a Moor-cock and Moor-hen [*Tetrao tetrix*]. I have gotten a black-legged Linnet [*Linota cannabina*]; and gathered a few of the *Vaccinia rubra* [*Vaccinium vitis-idæa*, Linn.], but cannot separate the seeds as you directed. As they are, I shall send them you. I have procured the skin of a great bird, which he that gave it me called a Scarfe [*Green Cormorant and Shag, C. Phalacrocorax graculus*]; but I believe it will prove a *Bernicle* [*Anser leucopsis*]. The description of it I sent to Mr. Willughby. I have gathered some words and proverbs which I believe you have not yet met with; and received from Mr. Fisher an account of the Hauke Butterfly. I shall send you all when I know which way I may do it safely. Richard Wright is come from London, and hath done little there; only the judge hath advised him to indite the man and the maid, if Stephen trouble him any more. This only is observable, which I was not acquainted with when you was with us, that Kurlew, the foreman of the jury, who, the spirit saith, was bribed by Stones, died raving mad within three days after he had passed his verdict, crying out that he saw the devil, and such-like expressions. This is very true, for I had it from one who was at his burial. The coroner also hath lingered away ever since the assizes, and died about the time that Wright went to London. The maid at Overhaddon still liveth, and eateth nothing. She hath been watched twice for fear of imposture; once by the directions of a physician who lives thereabouts, and for about a fortnight since by my Lord Devonshire's order, who sent his own servants by turns.

Having lately perused, amongst the Philosophical Transactions, my Lord Brounker's quadrature of the hyperbole, which pretends to have done it only as near as

you please, and reflecting upon some things that I had formerly considered, I grew almost confident that it might be done truly and geometrically by one that would go to work with it the right way. I am not so foolish as to think that I, who pretend not to be skilled so much as in the elements of Conics, can add any thing unto what they have done in their own way, in which they have been so long conversant. Yet, in my first entrance, there was one thing came into my mind, which all those who have written upon this subject have either not taken notice of, or neglected, which will go a great way in the business, and that is this.

Si dati sint duo coni Isosceles ejusdem altitudinis, axem habentes communem, et secentur hi coni à plano axi parallelo, possibile est exhibere quadratum, quod eandem habebit rationem ad spatium interceptum inter lineam hyperbolicam, quæ est in superficie majoris coni, et lineam hyperbolicam quæ est in superficie minoris coni ita secti, quam habeat linea hyperbolica minoris ad lineam hyperbolicam majoris coni, addita linea hyperbolica minoris coni.

If you think this worth your consideration, I shall send you the demonstration at a more convenient time.

I am, your affectionate friend and servant,

FRA. JESSOP.

Broomhall, Nov. 25, 1668.

Mr. WRAY to Mr. LISTER.

Joannes Wray D. Martino Lister, suo S. D.

QUOD partem aliquam lucubrationum tuarum mihi inscribere destinaveris, plurimum me tibi debere agnosco, proque tam insigni tuâ voluntate et propenso in me animo gratias quas possum maximas refero lubens meritò. Interim tamen monendus es, ne dum affectui nimium indulgeas minùs prudenter agas. Quin potiùs, dum

integra adhuc res est, deligas tibi patronum aliquem ex antesignanis illis, magnis literatum luminibus, unde et operi tuo aliquid dignitatis et tibi ipsi fructûs accedere possit. Ego enim ut qui tenuitatis meæ nimis conscius sum, haud equidem tali me dignor honore. Quod ad quæsita mea tam cumulatè et perspicuè respondisti, addito insuper corollario, de filis illis longissimis in aëre volitantibus, quæ tantopere stupet philosophantium vulgus, quorumque inceptas nescio quas et ridiculas causas fingit, pergratum habeo. Ego verò de hisce quoque te consuluissem superiore epistolâ ni è memoriâ excidisset, quamvis et ipse Araneorum ea opus esse nunquam dubitaverim. Sanè omnia hæc tibi explorata et prospecta fuisse ex ipsismet specierum titulis antea conjectabam. Et has et superiores tuas observationes dignissimas censeo quæ Soc. Reg. communicentur, quod et faciam tuo nomine tuisque verbis si tibi ità visum fuerit. Quamvis, ut nihil dissimulem, ex quo huc veni, dum philosophicas transactiones, quas vocant, lectito mense octobri editas, literis ex insulâ Bermudensi ad societatem scriptis simile quiddam observatum animadverto; quod tamen in tantâ telarum et Arancarum magnitudine nemini non obvium et factu facillimum fuit. Scribit enim Bermudensis ille telas eas adeò crassas et validas esse, ut vel turdis irretiendis sufficiant. Superest ut tibi aperiam, me jam in sylloge proverbiorum Anglicanorum (quam olim meditatus adagia undique tum ex familiarium colloquiis et ore vulgi, tum ex libris editis conquisiveram) ordinanda et adornanda totum esse; eamque brevi cum commentariolis in lucem emittere ni quid vetas, cogitare. Tu verò orandus es ut symbolum tuum conferas, et siqua minùs vulgaria et non invenusta adagia observaveris, aliquando ea nobis communicare non graveris. Formicarum nulla à me facta mentio, quoniam nihil certi haberem quod scriberem. An aculeum habeant nec ne, fateor mihi nondum experientiâ constare: nec enim periculum feci deses et negligens cùm mihi promptissimum fuit. Tu cùm id mihi persuadere conaris argumentis potiùs contendis

quam ad ἀυτοψίαν provocas. Ds. Willughby affirmat in minoribus formicis (nam majores in hâc viciniâ nullæ) sibi quæsitum, non visum tamen Aculeum an fortè oculorum vitio? Nam famulus, cujus ministerio usus est, adesse asserit. Ego verò expertus sum Formicas illas majusculas quas nostrates *Horse-ants* vocant, si illarum cumulos baculo aliquandiu agitaveris liquorem quendam acerrimum in baculum excernere aceto destillato non longè dissimilem, nisi quòd nares vehementius feriat. Cujus experimenti Dr. Fisher me primùm commonefecit cum Sheffeldiâ essem, qui et asseruit è formicis illis in cucurbitam conjectis se liquorem ejusmodi destillando elicuisse. Episcopum Cestriensem hîc propediem expectamus, namque nos in transitu se invisurum promisit. Verùm illius adventus hoc temporis articulo mihi non usque quaque gratus, quoniam subvereor nè Versionem libri sui vehementiùs urgeat, ego autem aliàs occupatissimus, tot simul negotiis vix sufficio. ****

Dabam Mediæ villæ viii. Id. Decemb. 1668. i. e. Decemb. 6.

Mr. LISTER to Mr. WRAY, in Answer to the foregoing Letter.

M. L. D. J. Wray, suo S. D.

NON est quod tibi pergam ampliùs molestum esse de *Araneis;* nisi quòd ipse jam proximè perlegeram epistolam illius Bermudensis, ubi factum quidem enarrat, sed fiendi modum ridiculum exposuit; nimirum fila ab iis exspui, ac si ex ore Aranearum et non ex ipso ano ejaculārentur: deinde istam ejaculationem, quod observavi, Araneis minimè usui esse in Reticulis pertexendis, non autem ad funes eorum suspensorios adfigendos. Sed de his aliàs plura et exactiùs; interim unum addam, quod superioribus literis omisi, me compertum habere *Araneas volatum exercere,* non solùm ob oblectationem, sed etiam ut Culices aliasque bestiolas capiant, quorum incredibili

vi aër circa autumnum repletur. Istam quidem venationem mirificam esse oportcat, sed ea adhuc non satis mihi innotescit: hujus tantùm benè memini in istis telis longissimis me membra Culicum, alas putà pedesque etc. decerptos sæpiùs animadvertisse, non aliter quàm in earum cubilibus et plagis. Quod ad *Formicarum aculeos* pertinet, oculis meis certam fidem habeo, eos quotiescunque id tentare libuit (tentavi autem sæpe) visos fuisse, nec nimium breves in minoribus, tum rufis, tum nigricantibus non alatis. Nam majores ἱππομύρμηκες, in nostrâ insulâ adhuc non observavi, in quibus tamen ii poterint esse magis conspicui. Sed jam suspicor ex proximâ inquisitione D. Willughby, eos posse deesse in aliquibus, si ut desunt alæ, atque in his fortassè sexûs discrimen aliàs videbimus. Cùm verò sermonem facimus de Aculeis, ego penè persuasum habeo, eos non deesse etiam Bufonibus et Lacertis nostris, imò verò in singulis tuberculis (quæ quot sint bene nôsti in rugosis cuticulis harum bestiolarum) singulos aut plures aculeos abscondi, et pro arbitrio exeri. Sed hæc tantùm mea conjectura, cùm experimenta quæ de iis meditor jam commodè exequi non potero. Illud verissimum est, tum Bufones tum Lacertas vexatas lactei cujusdam liquoris guttulas undique emittere; nec cur ita id faciant video, nisi subsint stimuli ad vulnus infligendum, quo tantùm eas nocere arbitror. Huc accedit ob similem rationem, quod nec te nec D. Willughby latet, inter Vermiculos è quibusproximâ fœturâ fiunt Scarabæi, unum genus reperiri passim in sylvis admodum virosi atque ingrati odoris depascens folia Populi albæ; hunc, inquam, Vermiculum, si lacessiveris, statim exerit duplicem ordinem stimulorum insignium, qui antea aut ex plano erant cum superiore parte corporis, aut certè velut parva tubercula paululum eminentes; in summis autem apicibus stimulorum stant singulæ guttulæ lacteæ: si bestiolam vexare paulisper mittas, protinùs subsidunt et guttulæ et stimuli, idque toties experiri licet, quoties animalculum vexaveris. Plura possem adjicere in hanc rem, estque tum copiosissima tum jucun-

dissima contemplatio de telis, quibus animalia et inferunt et propellunt injurias: sed ampliùs nec pagina nec epistolæ modus patitur. Vale xiv Calend. Januarias. [1664, ut opinor.]

Mr. WRAY to Mr. LISTER, at St. John's.

J. Wray D. Martino Lister, S. D.

Nos hic nuper *Arbores* nonnullas, Betulam v. g. acer majus sycomorum vulgò dictum, alnum, fraxinum, corylum et castaneam vulneravimus, ut indè succos colligeremus. In aliis expectationi nostræ eventus non respondit, at in betulâ et acere majore etiam superavit, siquidem medio Februario, incisione factâ liquor nutritius ubertim extillabat, diu noctúque absque ullâ intermissione, non obstante frigoris pòst subsecuti vehementiâ; etiam cùm succus statim post egressum suum è vulnere in stirias concresceret, antequam in vas ei excipiendo subjectum defluere posset, donec tandem in ipsis pororum osculis congelascens ea penitùs obstrueret. Sed et tunc quoque arbor interdiu denuò lacrymare cœpit quamprimùm sol glaciem dissolverat, et occlusos pororum meatus reserârat. Absque intermissione dico, non tamen omnino sine remissione; frigus enim fluxum inhibebat, quamvis non omnino sisteret, unde tempestate calidâ copiosiùs quàm frigidâ, et interdiu quàm internoctu ob eandem rationem destillabat. Tu si modò otium, animus, et facultas fuerit, eadem et his similia experiaris rogo, non tantùm in modò memoratis, sed in aliis quibuscunque arboribus, ut collatis postea experimentis, vel novis à te factis erudiamur, vel concurrentibus confirmemur, vel contrariis convincamur. Nec enim verisimile est pariter utrisque successurum, aut utrosque eadem observaturos, quin alteri inter experiendum obvenient vel succurrent plurima, quæ alteri vel nunquam contigerint, vel in mentem nunquam venerint.

Verùm aliàs de his plura, cùm reliqua quæ nobismetipsis experienda proponimus absolverimus. Superest ut tibi gratias agamus (Ego et D. Willughby), quod nos insigni errore liberâsti. Cùm enim olim Gallinagines minores *snipes* vulgò dictas, et minimas tibi *gids*, nobis *jack-snipes* titulo cognitas pro unâ et eâdem specie habuerimus, et sexu tantùm differre credidimus, partim vulgari præjudicio abrepti, partim quòd fortè fortunâ nobis oblati sunt in hoc genere duo aut tres mares, in illo totidem fœminæ; occasione tuarum literarum exactiore scrutinio facto, in utroque genere tum mares tum fœminas observavimus.

Debam Mediæ Villæ 3 Non. Mart. 1668, i. e. 13 Mar.

Mr. LISTER in answer to Mr. WRAY.

M. L. D. J. Wray, suo S. D.

DE Bufonibus hoc addo, mihi compertum esse, non sine insigni periculo, eos lacessitos posse longè ejaculari istum liquorem lacteum, de quo ad te antea scripsi, et præcipuè, de dorso, cervice etc. minimè de ore, aut ano. Rem tamen summâ cautione urgeo, earumque bestiolarum genus in species aliquot diduxi. ****

Idibus Martiis 1668.

Mr. WRAY to Mr. LISTER.

Jo. Wray D. Martino Lister, suo S. D.

DUM Cestriæ hæsimus, fortè fortunâ allatus est ad urbem *Delphinus* antiquorum, nostratibus *Porpesse* dictus, à piscatore quodam in vado captus, à quo eum modico pretio emimus. Erat autem piscis mediocris, longitudine unius ulnæ, non squamosus. In fronte fistulam habuit, quâ et respirare potuit et aquam rejec-

tare: tres duntaxat pinnas, in medio dorso unam, in ventre geminas, non procul à branchiarum loco, nam branchiis caret. Singulare est, in hoc pisce cauda ad corporis planum transversa, i. e. horizonti parallela et non perpendicularis, ut in aliis omnibus quos mihi hactenus videre contigit: nam è genere Cetaceo nullus antea mihi conspectus. Cerebrum ei et Cerebellum amplissima, piâ et durâ matre instructa, cranio osseo inclusa, et quadrupedum cerebris demptâ figurâ externâ (quæ in hoc latior erat nec adeò producta quàm in illis), persimilia. Quin et asperam arteriam et pulmones habuit quadrupedum more, qui folle inflati intumescebant, colorémque et speciem Bovinorum Caninorúmve omnino exhibebant. Cor gemino ventriculo instructum, cum eodem valvularum tricuspidum et semilunarium apparatu. Diaphragma musculosum. Hepar vel non omnino vel modicè in duos lobos divisum. Ventriculus membranosus duplex. Intestina Mesenterio annexa longissima 48 pedum mensuram implebant. Tenuium et crassorum distinctio nulla, nullum intestinum cæcum, nullum omentum, nulla cystis fellea. Pancreas amplum manifesto ductu intestinum perforat. Renes magni ad bovinos accedentes, ex pluriúnis granulis seu glandibus conglomerati, plani et non gibbosi, aut interiore parte concavi, ureteres ab inferiore extremitate egrediuntur. Vesica urinaria pro piscis mole exigua. Penis longus, tenuis, in vaginam reductus latitat ut bovinus: testes intra cavitatem abdominis, longiusculi, suis vasis præparantibus et deferentibus instructi. In summâ, partium omnium interiorum structura ad quadrupedes proximè accedit: nec puto eum sine respiratione per quadrantem unius horæ durare posse. Coit, generat, et educat fœtus ut quadrupeda. Quin et cerebri moles (quæ pro corporis ratione huic major est quàm plerisque quadrupedibus) sagacissimum esse arguit hoc animal, unde fortasse fabulosa non fuerint quæ à veteribus de ejus ingenio et mansuetudine literis prodita sunt. Astantium turba, curiosè omnia rimari et accuratam anatomen instituere, nos non permisit. Alia tamen plura observa-

vimus, quæ nè epistolæ modum nimis excedam, prætereo. Unum adjiciam. Totum corpus copiosâ et densâ pinguedine (piscatores blubber vocant), duorum plus minus digitorum crassitie undique integebatur, immediatè sub cute et supra carnem musculosam sitâ ut in porcis; ob quam rationem, et quòd porcorum grunnitum quadantenus imitetur, *Porpesse;* i. e. Porcum piscem dictum eum existimo. Sed de *Delphino* hâc vice plus satìs. Vidimus insuper Cestriæ fœminam cornigeram, cujus ad te famam jampridèm pervenisse puto. Si masculum cornutum ibi vidissemus, res non adeò mira fuisset. Præterea *Encrasicholos* pisces, seu *Anchovas* non procul inde in mari captos vidimus. Superest ut tibi aperiam, et in sinum tuum effundam quod ne non leviter pupugit. Pudet pigétque tabularum istarum botanicarum, in quibus conficiendis se operâ meâ usum esse prodidit episcopus cestriensis. Plurimùm interfuisset famæ meæ eas aut nunquam fuisse editas, aut saltem suppresso nomine; sunt enim confusæ et errorum plenissimæ. Tu quia nondum penitiùs eas introspexeris ideò non damnas. Dr. Morison in opusculo nuper edito, cui Præludia Botanica titulum fecit, illas, illarùmque tacito nomine autorem, an pro meritis an indignis modis excepit, aliorum judicium esto. Nec tamen mirum tabulas confusas erroneas et imperfectas esse, cùm trium tantùm hebdomadum opus fuerint, ego verò nihil antea ejusmodi destinaveram, nec de eo unquam cogitaveram. Præterea in iis ordinandis coactus sum non naturæ ductum sequi, sed ad autoris methodum præscriptam plantas accommodare, quæ exegit ut herbas in tres turmas seu tria genera quamproximè æqualia distribuerem, singulas deinde turmas in novem differentias illi dictas h. e. genera subalterna dividerem, ità tamen ut singulis differentiis subordinatæ plantæ certum numerum non excederent: tandem ut plantas unà binas copularem seu in paria disponerem. Quæ jam spes est methodum hanc absolutam fore et non potiùs imperfectissimam et absurdam? qualem eam ipse libentèr et ingenuè

agnosco, non tam existimationi meæ quàm veritati studens. Utcunque tamen autorem illum meritò contemno, qui quamvis adeò insons sit, ut nec latinè scribere nôrit, tam putidè tamen sibi adulatur, et stolidè superbit, ut viros millecuplo se doctiores contemnat, et iniquè secum actum putet, quòd non jampridem in cathedram professoriam evectus sit. Dum verò Societatem Regiam ineptissimè sugillat, seipsum sanis omnibus et cordatis viris deridendum propinat. „ Sed hæc mitto. De Bufonibus mira narras, et quæ ego alio autore vix credidissem. Observationes tuæ in tuto sunt, et societati jampridem communicatæ, quæ earum autori ignoto quamvis gratias agi jussit. Vale.

Dabam Middletoni Nonis Maii 1669, i. e. Maii 7.

In a Latin Letter of Sir PHILIP SKIPPON's to Mr. WRAY, of June 1669, I find this, viz.

AD Luddi portam nuper erat effossum antiquum monumentum hâc inscriptione.

D M
VIVIO MARCI
ANO 7 LEG.
AVG IANVARIA
MARINA CONIVNX
PIENTISIMA POSV
IT ME MORIAM

In eodem lapide est figura Militis.

Mr. WRAY to Mr. LISTER, at Nottingham.

DEAR SIR,—Having now received a second letter from you in English, I look upon myself as licensed to answer you in your own language. I am extremely obliged to you for the catalogue of plants you sent inclosed, they coming very opportunely, now that I am (chiefly by your instigation and encouragement) revising and preparing for the press my general catalogue of English plants, which I hope to finish and get published by the next spring. I shall go over all yours, and give you an account which are to me unknown, and which I have not yet met withal in England.

Muscus denticulatus major, Park. [*Lycopodium helveticum*, Linn.*], which you say grows plentifully in springs, it was never yet my fortune to find in England.

Muscus corniculatus,† Park., is frequent with us hereabouts, and with the like scarlet tops.

Muscus clavatus, sive lycopodium [*Lycopodium clavatum*, Linn.], grows, as you well observe, on all the moors in Yorkshire, Derbyshire, &c. plentifully, and on Hampstead-heath, near London.

Muscus clavatus cupressiformis, Park., or *Sabina sylvestris Trag.* [*Lycopodium alpinum*, Linn.], I have observed plentifully on Ingleborough-hill, and also on Cader Idris and Snowdon Hills, in Wales.

Your moss, like the pine-tree, I suppose is the same which I call *Muscus erectus abietiformis* [*Lycopodium selago*, Linn.], and have found on many of the moors.

Tilia fœmina is a tree very common in Essex, and many other counties of England; I mean the *Fœmina minor* of Park. [*T. parvifolia*, Ehrh.], for the *major* [*T. ulmifolia*, Linn.], I have not as yet seen anywhere with us spontaneous. I know not what to make of the *Tilia mas*, but suspect it to be all one with the *Carpinus*, or hornbeam.

* [Not found in Britain.]

† [Usually referred to *Cladonia furcata*, Hoffm.]

Ornus, sive fraxinus sylv., Park. [*Pyrus aucuparia*, Gærtn.], is common also hereabouts, though inaptly so called.

Erica baccifera nigra, Park. [*Empetrum nigrum*, Linn.], I have also, with you, observed plentifully on all the moors. It grows also on a heath within a mile of this place.

The other two sorts of *Erica* you mention are frequent on all the heaths of England.

Scorodonia [*Teucrium Scorodonia*, Linn.] also is a plant most common in the woods in almost all parts of England, excepting Cambridgeshire.

Sonchus lævis alter parvis floribus [*Lactuca muralis*, De Cand.] is no rare one; and two years since I found it within a mile of Cambridge.

Hieracium rectum rigidum, quibusdam sabaudum, J. B., *et Hieracium fruticosum angustifolium majus*, Park. [*Hieracium umbellatum*, Linn.], I do not distinguish, but make the same, and therefore desire you to tell wherein you put the difference. The plant I have observed in many sandy and some rocky grounds.

Your *Thlaspi fruticosum leucoii an globulariæ folio latissimo* is, for aught I know, a nondescript. I desire, if you have any of it dried, to send me a branch. I look upon it as a great discovery, if it be not *Camelina Ger.*

Pyrola vulgaris nostras [*P. rotundifolia*, Linn.] I have found in many places in the north.

I am much to seek what your *Leucoium*, or *Hesperis*, with a very broad leaf, should be, unless perchance *Bursæ pastoris loculo oblongo affinis pulchra planta*, J. B. [*Draba muralis*, Linn.], which I have found in Craven.

Lychnis sylvestris flore purpureo [*Lychnis diurna*, Sibth.] is a plant everywhere very common, and doubtless may be found in Cambridgeshire, though omitted in the catalogue.

The *Knoutberry* I have found on all those hills you mention, but with the fruit only on Hinckell-hoe.

Raspberry is also frequent on the mountains both in Wales and in the north.

Mentastrum, &c., Park., I have seen growing wild in one or two places.

Capilli veneris veri similes I desire to see a leaf of, if you have it dried. I guess it to be that which I have styled *Filix saxatilis caule tenui fragili* [*Cystopteris fragilis*, Bernh.]

Trachelium majus Belgarum [*Campanula latifolia*, Linn.] in the mountainous parts of Derbyshire and Yorkshire, &c., is very common in the hedges and thickets.

Digitalis purpurea is everywhere to be found in sandy and rocky grounds.

Anagallis lutea nemorum [*Lysimachia nemorum*, Linn.] is no less common in the woods.

Alchimilla vulgaris grows not only in all mountainous meadows and pastures, but also plentifully in the meadows hereabouts.

Turritis vulgatior [*T. glabra*, Linn.] is, notwithstanding its name, no ordinary plant with us.

Rhamnus primus Diosc. [*Hippophäe rhamnoides*, Linn.] I myself have not seen in England; but by Dr. Mapletoft was informed that it grew wild on the sea-coast of Lincolnshire, which you now confirm.

The low sort of *Salix* you mention I take to be the *Salix angustifolia repens* of Park. [*Salix repens*, Linn.], which I have seen wild in many places, but not in Cambridgeshire.

You have been more fortunate than I in finding *Valeriana græca* [*Polemonium cæruleum*, Linn.], which I have sought in vain among Fournesse Fells, where I was informed by T. Willisell that it grew wild.

Solanum lignosum flo. albo [*Solanum dulcamara*, Linn.*] may, for ought I see, be a new species.

Lathyrus sylvestris lignosior, Park. [*L. sylvestris*, Linn.?] is to be found in the woods in most counties of England, except those midland clay grounds in Cambridgeshire, Bedfordshire, &c.

* [With white flowers.]

Your small *Lathyrus*, with a pale yellowish flower, is to me unknown, and I believe a nondescript.

Vaccinia nigra vulgaria [*Vaccinium Myrtillus*, Linn.] few counties of England want. The *Palustria Thymi foliis* [*Vaccinium oxycoccos*, Linn.] are more rare, though hereabouts we have them in great plenty.

The rose with the large prickly fruit I take to be the *Rosa sylvestris pomifera major*,* Park., which I have observed in many places in Yorkshire.

Alsine aquatica folio oblongo [*Stellaria uliginosa*, Linn.] is a stranger to few places.

Phalangium nescio cujus, is it not *Pseudoasphodelus Lancastrensis?* [*Narthecium ossifragum*, Huds.] which is common in boggy places in the north and west of England.

Geranium muscum olens [*Erodium moschatum*, Sm.] I have found, yet never but once, wild in England that I remember.

Bistorta, &c. [*Polygonum Bistorta*, Linn.], I have seen in the meadows about us here.

Crocus autumnalis pratensis, unless you mean *Colchicum* (which in the west parts of England I have observed plentifully growing wild), I know not.

Raphanus rusticanus [*Cochlearia Armoracea*, Linn.] I never met with in the fields or meadows, where I could be assured it came spontaneously.

So, sir, I have despatched your catalogue, and you may well wish that my letter too were despatched; but I have from Mr. Willughby a business of private concernment. I could wish you would take pains to revise my Catalogue of Plants before it goes to the press: if you will do me that kindness, I will send the copy over to you the next opportunity.

Sir,

Your very affectionate friend, and humble servant,

JOHN WRAY.

Middleton, Novemb. 15, 1669.

* [Probably *R. villosa*, Linn.]

Mr. Wray to Mr. Lister.

Sir,—I have perused the dried plants you sent me, and, according to my best judgment, added names to such as wanted, and do now with thanks return you them back again. The plant you judged to be a *Thlaspi*, is nothing else but *Glastum* [*Isatis tinctoria*, Linn.]; and that which you titled *Lotus*, is *Fumaria alba claviculata* [*F. claviculata*, Linn.] Your *Hesperis* is to me altogether new, never before seen in England or elsewhere: whether it be by me rightly referred, you are better able to judge who have seen the plant growing, and its flower in perfection. The *Mentastrum* I have found growing wild plentifully about Florence, but never in England. That which you style *Capillo veneris vero similis*, I make to be a sort of *Adianthum aureum*. I have often in moist places found straggling branches of such leaves at the roots of *Adianthum aureum minus*, but never growing so many and thick together from the same root, all of the same kind, but once, and in such a place as yours was now found. That you may be convinced that the *Muscus* you styled *denticulatus major*, is not that so named by herbarists, I have, out of Mr. Willughby's store, sent you two branches of the *Muscus denticulatus major*, which I must entreat you to return again, at least one of them. We have made bold to take part of such of your plants as we wanted, where you might well spare it. If you have any sorts of *Mushrooms* specifically distinct from those I have inserted, and of whose names you are sure, I should be glad of them, and willingly afford them room. Such of your grasses as I have not put names to I am as yet doubtful of. The Roses you mention I am well acquainted with; the lesser being the *Pimpernel* rose of Gerard [*Rosa spinosissima*, Linn.], you will find something of in my Catalogue, which I herewithal send you, entreating you to read it over so soon as your leisure will permit, to correct, as you shall see cause, and to send me your animadversions and remarks upon it, and such

additional observations of your own as I have omitted. I should be glad to know whether you have observed and considered the small *Caryophyllus* [*Dianthus deltoides*, Linn.] growing near Nottingham (as I take it about the gallows), because Th. Willisell would persuade me that it is distinct from that found about sandy,* and several other places in England. I once saw it but did not take exact notice of it; and whether you have heeded the *Polemonium Petræum Gesneri* [*Silene nutans*, Linn.], which he brought us from Nottingham Castle walls. Many things there are in this Catalogue which I have not sufficiently cleared; however, I am resolved now to huddle it out and get my hands rid of it. One thing I must not omit to tell you, that I have robbed you of the credit those observations you communicated to the Society have gained in foreign parts, by letting my name stand before them and suffering yours to be suppressed; for I hear they are attributed to me: whereas I never had either the wit to find out, or the good fortune to hit upon any so considerable and unobvious experiments. Proceed in your ingenious studies and inquiries, for methinks Providence doth seem remarkably to succeed your endeavours, and communicate somewhat of your discoveries from time to time to,

Sir,

Your very affectionate friend, and humble servant,

JOHN WRAY.

Middleton, Decemb. 10, 1669.

MR. LISTER to MR. WRAY.

MY DEAR FRIEND,—I am glad to hear you commend Salmasius; I never yet read the preface, but you speak judiciously of the work: I remember you once took away the prejudice I had against Pliny, and I have ever since

* SANDY is the name of a place in Bedfordshire, not an adjective.

looked upon him as a great treasure of learning. I could wish that you would give us your thoughts, too, of both the ancient and modern historians, and add this to your preface. I remember my Lord Bacon rashly censures all, and rejects the whole design as supervacaneous; but yet, methinks, not without some contradiction to his own principles; for if a particular nature or phenomenon may be in some particular body more bare and obvious, without doubt the greater number we have of particular histories, the plentifuller and clearer light we may expect from them. For my part, I think it absolutely necessary that an exact and minute distinction of things precede our learning by particular experiments, what different parts each body or thing may consist of; likewise concerning the best and most convenient ways of separation of those parts, and their virtues and force upon human bodies as to the uses of life; all these, besides the different textures, are things subsequent to natural history, unless you make the last assistant, as indeed all the rest are, were they truly known; but I am too bold to venture thus much, before my master, and I hope you will now soon let the world know they have too long neglected what you can teach them to prize. Another time we will, if you please, talk of the advantage England has in being an island, to set a copy of this nature to the rest of the world, and to set forth exactly what she has of her own. I am but a learner, and a very young one in minerals, but I am pretty confident that it is *yellow Amber* they find not unplentifully after great storms on Lindsey coast. I have near lib. i. by me that I bought of the poor fishermen's wives at Thedle Thorpe; some pieces of it are transparent and of a dark yellow; others alike transparent, but of a brighter yellow; others again are of a pale yellow and troubled, as though they were fattish: likewise of the jet, i. e. the great pieces and grove, i. e. the small dust, I have of both by me, and I do think them not channel, because they burn with much difficulty and are not kindled but on wind-hearths, as I

may call them, being the country people that make use of it have fire-hearths, made on purpose for that fuel, that have holes under them, which are pierced through the foundation of their houses; whence an unmannerly proverb is used among them, "Neighbour, is the wind in your hole this morning?" That is, have you the conveniency of keeping in fire to-day; else it grimes not, is light, and many pieces if rubbed will draw straws: if I have an opportunity I will send you of the one and of the other, and also the legs of the Buzzard [*Buteo vulgaris*], for that is all I have of it by me; but upon comparing them with the Kite [*Milvus vulgaris*], the Bald Buzzard,* and Wood Buzzard,† you will find them exceedingly different: but Mr. Willughby did almost persuade me it was the *Milvus æruginosus*, Aldr.;‡ for, indeed, it is of a self colour, that is, all over of one rusty colour, just like the rust of iron, as you may guess by what feathers yet stick to the knees. You will be pleased, at your best leisure, to send me an account of the authors that have written on minerals and fossils, for I am, as I said, but a beginner, in this part of natural history, and I have great encouragement, besides my profession, not to be ignorant in this part especially, having great hopes of considerable mines in my own lordship in Craven; therefore I would furnish myself with the best authors.

I had written almost hitherto when Mr. Willughby's keeper brought me the happy piece I so long desired to see; I read it over forthwith greedily, and am extremely pleased that you have added the particular uses to the titles. I have no additions to make you an offer of, only I read it not without pen, ink, and paper by me, on which I now and then scrawled something, and have taken the boldness to send it you.

Mr. Willughby was, as it were, desirous to know some-

* [A name for the Osprey, *Pandion haliæetus*.]

† [Which of the three.]

‡ [Milvus æruginosus of Aldr. is a Harrier, and now called the Marsh Harrier, *Circus æruginosus*.]

thing further of me concerning my 'History of Spiders.' The whole is yet imperfect; but, however, I have transcribed the tables, that he may for the future join with me, and assist me in the prosecution of my design, as to this part of the 'History of Insects:' for, for the other parts, I must neglect them in a manner; but this will still be my particular ambition, to look after with care. He may freely command my papers at any time; and, when you have corrected the style (for there must be faults in it), if you think fit, make him a present of it in my name; or otherwise, make use of it as to your tables now in hand.

I thank you for the pains you took to note my plants, and to name them; it is a great satisfaction to me: I have, in acknowledgment, sent you the things mentioned in this letter, viz. of our amber and jet. One thing I must add, that you may not think that this is casually cast upon the shore, for it is the constant effect, more or less, of winter storms; and the poor drive a kind of a small trade with it, the apothecaries and others buying it of them at about 3*d.* an ounce. Also I send a leg of the Buzzard, a preserved medler: to these I add, by way of present, a couple of pastiles, or small cakes of the juices dried in the sun, of our English store of plants; they are unmixed and purely natural, as they were taken from the plants by incision. The one was in the drawing or issuing out of the plant a purple juice, the other of a gold-colour. The one burns freely with a flame, and is of no offensive or ungrateful smell; the other burns not at all with a flame, at least continues it not, and is intoxicating: they are both bitter. Guess me the plants that afford them, *et eris mihi, ut revera es, magnus Apollo.* I have a score of different juices besides by me in cakes, but these are (if I mistake not, at least to the best of my knowledge), nowhere made mention of by any author, although the plants be common in England. They are the juices of no fruit, but of the body of the plant.

Dec. 22, 1669.

Mr. Wray to Mr. Lister.

Dear Sir,—I return you most hearty thanks for the pains you took in perusing my Catalogue, and for your animadversions and observations thereupon. Your opinion grounded upon experience, that *Opium* and all *opiates* are highly venereal, if taken moderately, I willingly embrace. The reason which induced me to subscribe to the common opinion, was not because I imagined them to be cold, as the former physicians fondly conceited, but because they do in a large dose fix the spirits and inhibit their motion, as appears in that they are anodynous and soporiferous; and the sperm being a spirituous body, I was thence induced to think that they might hinder its turgescency. But, upon further consideration and inquiry, I find the effects of *Opium* to be something analogous to those of wine and other generous liquors, which, moderately drunk, incite to venery, but to excess, become soporiferous and narcotic, extinguishing that appetite. Whence it is supposed to proceed, that the Germans are of all nations most continent and least addicted to women. I thank you, likewise, for your note out of 'Olearius' concerning *Hemp*, which I have now entered. I intend to follow your advice in adding something to my preface concerning the usefulness of being particular and exact in natural history; but much I have not to say concerning that point, and I am fearful of enlarging my book and swelling it to a greater bulk than may commodiously be carried about in one's pocket, for that will make it unuseful, and consequently less saleable; besides that, it is not proper to set a great porch before a small house. I must not forget to thank you for the present you sent me. I agree with you, that what you sent in small pieces and consequently the rest of the same nature cast up on your coast of Lindsey, is *yellow amber*. The like variety of colours is observed in it wherever it is found; and the other great piece is truly jet and not cannell. By the leg of the Buzzard, and the description you for-

merly sent me, I am confidently persuaded it is the *Milvus æruginosus*, Aldrov.* As for the authors who have written of minerals and fossils, I have not been so conversant in that part of learning as to be able to give any judgment concerning them. Georgius Agricola, *De re Metallica et re Naturâ Fossilium*, is of all men approved, though I must confess myself never to have read him; and I suppose Lazarus Erker, a German, is a good writer on that subject. I have run over Kircher's 'Mundus Subterraneus,' though I must needs say I was not much improved by it; yet some use may be made of it. Some help it hath been to me to have seen various collections of minerals with their several titles in cabinets beyond the seas. I am not so cunning as to tell, or give any probable guess, what those plants should be whose juices you sent; indeed I do not pretend to a critical palate, but I must desire to be informed by you. Of your table of spiders I shall at present add nothing: I doubt not but it will be of great use to me when I shall have leisure to prosecute that inquiry. Since I received my Catalogue from your hands, I have procured some considerable experiments and observations, medical, from Dr. Needham and some other ingenious physicians of my acquaintance, so that I have not yet sent it to be printed.

Middleton, Feb. 13, 1669.

Mr. LISTER, at Craven, to Mr. WRAY at Middleton Hall.

MY DEAR SIR,—I have been adding this last year's notes to the former, and I have found enough to cause me to make considerable alterations and amendments everywhere, and especially in the table (of spiders) I sent you; so that I could wish it in my hands again, and, if you think it worth the while, another of yours in exchange. I am sorry that your Catalogue is not yet in the press;

* [See Note, page 50.]

and yet, methinks, those experiments that you tell me you have received from Dr. Needham and your other friends, will be mighty enrichments: I long to see what they are. As for the juices I sent you, the one is drawn from *Centaureum luteum* [*Chlora perfoliata*, Linn.], the other from *Lactuca sylvestris* [*Lactuca virosa*, Linn.] My notes of this nature being, for the most part, but of one year's standing, I am loth to venture raw conjectures even before so kind a judge as you are of my papers, otherwise I assure you, there is nothing I have observed or tried but I would willingly impart. I know you have not been unemployed about prosecuting your experiments upon trees, and I should be glad to know the success, both as to the motion of the sap in them, and likewise the texture; about which last I am confident Mr. Willughby is very thoughtful and diligent, and I hope fortunate.

Mr. WRAY to Mr. LISTER.

DEAR SIR,—I have sent you inclosed two papers, the one containing descriptions of birds, which you communicated to Mr. Will at his last being at Wollarton, to which we have added the Latin names of Aldrov. Only the third I take to be a fowl distinct from the common Widgeon, which is not unknown to you. Indeed I do not remember that ever I saw any bird of the duck kind which hath a circle of white feathers round about the setting on of the bill.* Your descriptions of the rest that I have seen are very exact. The other paper being a table of our English spiders I have sent, not that I can discover any error or defect in it, but because you desire it. In prosecuting the experiments about the ascent and motion of the sap in trees, I was interrupted by a few fits

* [The duck with a broad band of white feathers at the base of the bill is an old female of the Scaup Duck, *Fuligula Marila*.]

of a tertian ague, which, I thank God, I have been now a good while rid of. Something I have since done, of the success I will give you an account when the season of bleeding is quite over. Some experiments I have made this spring, which seem not well to agree with those I made the last. My Catalogue I believe is not yet begun, the undertaker, Mr. Martin, staying for a new letter; he promiseth me to take special care both of the letter and paper, and correcting, that it may in all respects be well done. My Collection of Proverbs I have given to Mr. Morden of Cambridge, who desired it of me, and promises to get it well printed. We do now shortly expect the Bishop of Chester here, for whom principally I stay at present, my private affairs calling me into Essex. When I have had conference with him, and settled and stated things concerning his universal character, I intend to set afresh upon and despatch the translation, that so I may be free to prosecute my own inclinations and studies. Having but little time, I can add no more than my best wishes and prayers for you, and for your lady's good success, remaining as always.

Mr. WRAY to Mr. LISTER.

DEAR SIR,—This next week we expect the Bishop of Chester at Middleton, who desires our assistance in altering and amending his tables of natural history. To make exact philosophical tables, you know, is a matter very difficult, not to say impossible; to make such as are tolerable requires much diligence and experience, and is work enough for one man's whole life, and therefore we had need call in all the assistance we can from our friends, especially being not free to follow nature, but forced to bow and strain things to serve a design according to the exigency of the character. To what purpose you will say is all this? To make excuse for this importunity in beg-

ging your table of spiders, which I earnestly desire you would send us to Middleton as soon as possibly you can; though not so perfect as you intend it, yet as it is; for this work hath stuck long upon our hands, and we do now resolve to despatch and get quit of it. My general Catalogue I have lately heard nothing of; I am afraid they have not yet begun it. Some weeks since the bookseller wrote to me to know whether I would be willing to respite the printing of it for a fortnight, till he might get a new letter cast for it. I returned him an answer that I was willing, if he thought it for his own interest, because I thought it would be for the advantage of the book. My Collection of English Proverbs I have also despatched away to Mr. Morden, who desires the printing of it. Being ere long to take a journey into Essex, I accompanied Mr. Willughby hither, partly to take a view of these parts at this season of the year, partly out of some hopes (though I confess very little) of finding you here. I have here observed growing about Nottingham-castle walls the *Lychnis* [*Silene nutans*, Linn.], called by Gesner *Polemonium petræum*, which I remember to have sometimes mentioned to you, brought us first from thence by Willisell. And, on the sandy grounds, a sort of small Vetch, now in flower, which I have not before observed, though it is likely it may elsewhere be found. Also *Auricula muris pulchro flore*, J. B. [*Cerastium arvense*, Linn.], and *Nasturtium petræum* [*Teesdalia nudicaulis*, R. Br.], by some called *Bursa pastoris minor*, are frequent in the sandy grounds hereabout, now in flower; else, I have discovered nothing to me absolutely new, though it is a little too early in the year for simpling, especially the spring being very backward.

Wollarton, April 28, 1670.

Mr. Lister's Answer to the foregoing Letter of Mr. Wray.

My dear Friend,—The beginning of May I returned an answer to both your last letters to me, and likewise inclosed the table of spiders you desired of me. They were sent by the post to London, and I hope did not miscarry; however, I cannot be satisfied concerning them until I hear from you, and therefore I have sent you this billet by Wollarton gardener from Nottingham.

I cannot tell what to add, but that I intend you an account of my simpling here before or about autumn. Yet, because some plants in your catalogue now in printing stand upon my parole, concerning the one of them I was abundantly satisfied, having found it in that plenty above Skipton, and in the beck from thence. And as for *Valeriana græca* [*Polemonium cæruleum*, Linn.], I have found that also in an unquestionable place this last week, both with a white flower, and also a blue one, viz. under Maulam Coze,* a place so remarkable that it is one of the wonders of Craven. It grows there on both sides the spring in great tufts, and if the Catalogue be not yet printed off, I could wish that this place might be added to the former. I have found many plants near to me which I will reserve to another opportunity, not willing to make this more than a billet.

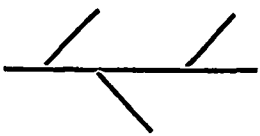
Carleton, June 4, 1670.

Dr. Hulse to Mr. Wray.

Sir,—As to my observations of spiders projecting their threads, take them thus. I have seen them shoot their webs three yards long before they begin to sail, and then they will (as it were) fly away incredibly swift; which phenomenon doth somewhat puzzle me, seeing oftentimes the air doth not move a quarter so fast as they

* [This plant still grows at Malham Cove in the spot mentioned by Lister.—C. C. B.]

seem to fly. Mostly they project their threads single, without any dividing or forking at all to be seen in them. Sometimes they will shoot their threads upward, and will mount up with them in a line almost perpendicular; and at other times they project them in a line parallel to the plane of the horizon, as you may often see by their threads that run from one tree to another, and likewise in chambers from one wall to another. I confess this observation at first made me think they could fly, because I could not conceive how a thread should be drawn parallel between walls, as above-said, unless the spider flew through the air in a straight line. The way of forking



their threads may be expressed by the following figure. What reason should be given of this dividing I know not, except that their threads, being thus winged, become able to sustain them in the air. They will often fasten their threads in several places to the things they creep up: the manner is by beating their bums, or tails, against them as they creep along. This line will express the way:

—·—·—·—·—·—·—·—·—

By this frequent beating in of their thread among the asperities of the place where they creep, they either secure it against the wind, that it is not so easily blown away, or else whilst they hang by it, if one stitch break, another holds fast; so that they do not fall to the ground. There is another thing I have to deliver about these webs, but as yet I am in some doubts about it; and therefore at present I shall remain.

June 28, —70.

NOTE.—Notwithstanding this letter of Dr. Hulse was published by Mr. Oldenburgh from Mr. Wray, in Phil. Trans., No. 65, yet I think fit to reprint it, that the reader may have all the original letters relating to the

first discoverer of that curious phenomenon of the flight of spiders, which I have spoken of in my Physico-Theol., book 8, chap, 4, note 5.

The true history of the invention I take to be this :— Some time after Mr. Wray's return from his foreign travels (which was in March, 166$\frac{5}{6}$); Dr. Hulse told him of spiders darting their threads, i. e. transversely, with force, parallel to the horizon. Mr. Wray consults Dr. Lister about this, he being the best acquainted with this tribe of animals of any man. His letter to this purpose you have, page 29 [which, unfortunately, is without the date of the year, but was, I guess, in 1668]. Dr. Lister, in his answer, page 31 [without any other date also than 10 Kal. Dec.], acquaints him that spiders not only shoot out their threads, but fly also upon them, and shows the manner how he came to discover it. After this Dr. Hulse wrote this very letter to Mr. Wray, which, being curious, and particularly in relation to spiders, Mr. Wray sent an account of it to the Royal Society; and finding it questioned which of his two friends, Dr. Lister or Dr. Hulse, first made the discovery, Mr. Wray writes the letter of excuse following of July 17, 1670, and after that the other of April 13, 1671, which, no doubt, gives the true state of the discovery, viz. that although Mr. Wray had the first hint from Dr. Hulse of spiders shooting their threads, yet the discovery of their flight was first told him by Dr. Lister; and in all probability these two ingenious gentlemen, bending at the same time their inquiries about the same animals, might hit upon the same discoveries, as I well remember that, when I myself was first prying into this matter, I soon saw the spiders take their flight, as well as dart their webs from the tops of thistles, &c. W. D[ERHAM.]

Mr. Wray to Mr. Lister.

Sir,—For my own part, I have made few discoveries in plants this summer; only I have observed *Gramen agrorum venti spicâ*, Lob. [*Agrostis spicâ-venti*, Linn.], to grow very plentifully among the corn in the sandy grounds in this country, and have now seen the *Polemonium petræum*, Gesn. [*Silene nutans*, Linn.], in flower and seed all about Nottingham Castle, on the walls and rocks. The Pink [*Dianthus deltoides*, Linn.] which grows by the highway sides of the sandy hill you descend going from Nottingham to Lenton, I find to be the same with that which grows on the hills about Sandy, in Bedfordshire, near Juniper Hill, in Cambridgeshire, Bridgenorth, in Shropshire, and in many places of Berkshire. Thomas Willisell sent me *Alsine foliis hederaceis rutæ modo divisis* [*Veronica triphyllos*, Linn.] (if I mistake not I use Bauhine's name), which he found somewhere in Norfolk, and a sort of Willow [*Salix amygdalina*, Linn.?] growing about Darking, which, as he saith, casts its bark, and stands bare some part of the year. Mistletoe growing on the Hazel I took notice of this spring near Braintree, in Essex, but that is a thing scarce worth the mentioning. Your experiments concerning the motion of the sap of trees do marvellously agree with those we have this year made, as you may perceive by a letter of Mr. Willughby's, inserted in the Philosophical Transactions, wherein there is a bad mistake, which perverts the sense, of the word *morning* instead of *noon*. Mr. Willughby presents his service to you, and wonders you should stick so to the number of thirty-one species of spiders; whereas, either he deceives himself, or he hath found out many more, and believes there may be, at the least, double that number in England. In your table of spiders, I do not well understand the term *scutulata*, whether it be to be understood of the texture and meshes, or the figure of the webs. Pardon this confused jumbling of things to-

gether, for I have not leisure enough to consider what I write, nor to add more.

Wollarton, June 29, 1670.

Mr. WRAY to Mr. LISTER.

DEAR FRIEND,—In my last I committed a mistake, and therefore it is requisite I make haste to mend it. It was in the name of the *Alsine*, which I told you Thomas Willisell found in Norfolk, and sent to me. I should have titled it *Alsine folio profundè secto, flore purpureo aut violaceo*, J. B. *Triphyllos cærulea*, C. B. [*Veronica triphyllos*, Linn.] The name I sent you in my last is *Lobels*. Tho. Willisell hath been lately here in his return out of the north, and brought with him several rare, and some nondescript, plants, viz. *Pyrola alsines flore europæa* [*Trientalis europæa*, Linn.] in flower, which he found in Northumberland, near the Pict's Wall, five miles from Hexham. *Salix pumila folio rotundo*, J. B. [*S. reticulata*, Linn.*], on the top of Ingleborough Hill, *Echium marinum*, P. B. [*Lithospermum maritimum*], near a water-mill between the Saltpans and Berwick. *Orobus sylvaticus*, n. d. [*O. sylvaticus*, Linn.], at Bigglesby, five miles from Pereth, in Cumberland. *Chamæ-periclymenum dictum sed malè* [*Cornus suecica*, Linn.], on the north-west of the highest of the Cheviot Hills. *Pentaphylloides fruticosum sive arborescens* [*Potentilla fruticosa*,

* [As that plant has not been found on Ingleborough since Ray's time, and *S. herbacea* (not included in the two editions of his Synopsis, published by Ray himself, but added by Dillenius in the third edition) is found there, I am led to think that Ray may have misapplied J. Bauhin's name, calling *S. herbacea* by the name really belonging to *S. reticulata*. Whernside, in Yorkshire, and "North Wales, on the tops of most high mountains," are given in the Synopsis as other stations for *S. pumila folio rotundo*, J. B.; but the plant found on Whernside, and frequently on the Welsh mountains is *S. herbacea*. *S. reticulata* has not been found in Wales. The report of its growing there rests solely upon Ray's authority.]

Linn.], an elegant plant (and, as I think, not described), on the banks of the river Tees. *Vitis idæa magna quibusdam, sive Myrtillus grandis*, J. B. [*Vaccinium uliginosum*, Linn.], in Cumberland, at a place called Orton, in the midway between Hexham and Pereth. These I have inserted in the Appendix of my Catalogue, which now goes on apace, I having received six sheets more since I wrote to you, which reach as far as the beginning of M. The Appendix is now grown, I think, as great as one fourth part of the book, I having gained several new medical observations, which I hope may be of good use. This summer we found here the same horned *Eruca*, which you and I observed about Montpelier, feeding on *Fœniculum tortuosum* [*Seseli tortuosum*, Linn.] Here it was found on common Fennel. It hath already undergone the first change into a chrysalis, and we hope it will come out a butterfly before winter. I must deprecate your displeasure for publishing to the world (in case Mr. Oldenbergh print my note, as I believe he will), that Dr. Hulse was the man from whom I had the first notice of spiders projecting their threads. The observation is yours as well as his, and neither beholden to other (that I know of) for any hint of it, only he had the hap to make it first; and being questioned about it, I could do no less than own the first discovery of it, to me, to be from him, who indeed communicated it to me so soon as I saw him, immediately after my return from beyond sea. I long for an account of the fruit of your summer's simpling. I believe few things thereabout will escape your notice; and yet you are in one of the best quarters of England for variety of choice simples. I would not have you think of buying my Catalogue, for I design you one so soon as it is printed, if I may know how to convey it to you. Let me not lose your love and friendship, which I do very highly prize; and therefore should be loth to do or say anything which might give you any displeasure, or alienate your mind from me, or in any measure abate

and cool that affection and goodwill which you have professed to me.

Middleton, July 17, 1670.

Mr. WILLUGHBY to Mr. WRAY, from Ludlow, 13 Kal. Augusti.

F. W. Johanni W., S. P. D.

NUNC scribo ut te certiorem faciam, quòd episcopus noster in reditu è Fonte Spadano prope *Banburiam* (ubi aquas nunc bibit) *Middletoni* cupit tabulas suas perficere et emendare. Obnixè igitur rogo ut sinè morâ illuc festinares; ut si fieri potest ibi sis ante Idus Augusti. Sinè te enim frustra erit aliquid ejusmodi aggredi.

Mr. WILLUGHBY's Observations.

OF ENAMELLING.

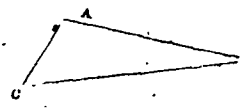
MOST of the pastes come from ——. They first engrave the rings to receive the enamel, then lay on the enamel, and put it either in a furnace (or for a single ring, lay it on a charcoal), and melt it with the blast of a lamp, blown upon it with a crooked pipe; then they rub it smooth with a whetstone, and melt it again, and at last restore a gloss, by boiling it in water where there is aqua fortis, &c.; and at last rub it over again with a smooth steel.

OF SODDERING.

To sodder gold, they always use the coarser to sodder the finer. They dip a thin plate of gold in borax, and, laying it in the chink to be soddered, then they melt it with the flame of a lamp.

A ring may be stretched to any bigness, by driving

cone, or the segment of a cone, into it. Fishes are made biggest before, that they may always move easiest forwards, it having been found out by Sir William Petty that a triangular piece of wood, A B C, will always move in water with the great end, A C, forwards though it receive the impulse upon the sides A B, C B.



Mr. Ray to Dr. Lister.

D. Martino Lister Jo. Raius, S. D.

Amice Charissime,—Catalogum meum plantarum Angliæ ad te tandem mitto; mole quidem non ità magnum, at pretio minorem. Nescio an aliis placiturus sit, mihi certè minimè placet; nec enim in iis quæ scribo mihimet ipsi unquam satisfacio: in hôc egò affectum erga me tuum agnosco, at judicium desiderare cogor, quòd autor mihi fueris ut eum emitterem. Præter illa quæ ad calcem libelli emendata invenies, alia inter legendum errata observavi, operariorum incuriâ admissa. quorum graviora, in exemplari quod misi, calamo emendavi; leviora illis ignoscas, tibique ipsi emendes rogò. *Valerianæ græcæ* locus quem inserendum bibliopolæ mandavi, typographi negligentiâ nescio quomodo omissus est, magno meo dolore. De scriptoribus botanicis antiquis et recentioribus quæ sentiam in medium proferre, deque eorum scriptis censuram exercere, non sum ausus, nè crabrones irritem. Cùm enim aliquid necessariò dicendum foret de nonnullis qui adhuc in vivis sunt, cùmque librum si malus est nequeam laudare et poscere, eorúmque diatribas et rhapsodias vituperio potiùs quàm laude dignas judicarem; ne eorum offensionem incurrerem, et ut quieti meæ consulerem, consultius duxi locum hunc de botanicis omnino intactum relinquere, deque eorum operi-

bus altùm silere, si ità loqui liceat. Quod tibi communicem à me noviter inventum, aut observatum, nihil aliud habeo quàm quod in Philosophicis Transactionibus dictis invenies, de *Ape quâdam sylvestri* quæ mirâ artè nidificat (ut ità dicam) aut cellas fabricat fœtui suo è particulis foliorum rosæ decisis; quarum locum, magnitudinem, figuram, usum ibidem descriptos invenies.

Videbis me in titulo catalogi et dedicatione literam nominis mei initialem W abjecisse, quod nè mireris, fateor tibi, me eam olim, antiquâ et patriâ scriptione immutatâ, citra idoneam rationem adscivisse. Restat jam ut consilium à te petam, nuperrimè enim amplissima mihi conditio oblata est, si velim tres adolescentes celebri loco natos, in exteras regiones peregrinaturos aut ducere aut comitari, consilióque meo et operâ juvare. Ego certè meipsum tali negotio imparem et minùs idoneum judico; nec si idoneus essem puto me tantam mercedem aut stipendium mereri posse. Centum libræ annuatim offeruntur, necessariis omnibus expensis etiam persolutis. Tu quid de hâc re sentias ocyùs rescribas.

Mediæ Villæ xi Kal. (Aug. 22) Septemb. 1670.

Dr. LISTER to Mr. WRAY, from York, in Answer to the foregoing Letter.

DEAR SIR,—I will not omit, that having bored deep into a fair and aged sycamore the latter end of May, it did not run at all, neither what remained of that month, nor the month following that I observed; but the bark put out a lip, or wreath, and seemed to heal. The beginning of July I cut out an inch, or more, square of the bark, at about my height, in the body of the same tree. This wound ran the next morning so as to drop, and yet always towards noon it dried; and the same wound, for twenty-one days after (which was as long as I stayed to observe it), never failed to drop in the

morning, and to dry before eleven. This experiment I repeated upon a much less tree, and for five days it succeeded in like manner, but then gave over. The deep-bored wound in the first large tree was not altogether dry (although it seemingly was healed) at running hours.

I have added this summer three sorts of spiders to my thirty-one. You may explain *Reticula scutulata*, by adding *in planâ circuli figurâ;* and so *scutulata* will be limited to the meshes.

This letter was writ, as you may see, before I received yours, and had been sent, but that I deliberated a post, whether it was not safer to send it by Nottingham. I thank you for my very welcome present, viz. *Catalogus Plantarum.* I am still of the same mind, and rejoice that it is public; and I am confident considerate men will think themselves highly obliged to you, both for your new discovered plants, and for the pains you took in correcting the faults and mistakes of others; that is, you took pains to save it us, most writers of this subject having been more vain than diligent and cautious. I was pleased with the derivation of your name whilst *U* was at it, it agreed so well with a virtue so eminent in you, and which, I am confident, you will never lay aside, however you please to alter the writing of your name. You well know what *Vray* in French means. I have not seen the last Philosophical Transactions yet; but I observed a bee much like the hive-bee in colour, yet somewhat broader and flatter. The manner of housing of her young with leaves I showed to many of our fellows when I was at the college. They make use of all sort of leaves indifferently for this purpose, as the sallow and thorn; and they were mightily pleased with the soft leaves of certain blue-pipe trees, or lilax, which grew in our walks. The long pieces are scaled one upon another, and the round ones do stop up both ends. There was a single bee-worm in each cell, and provision of meat. They were rammed one upon another in holes deep bored into the body of a willow, &c.; but I shall give all

the history in Philosophical Transactions. I joy you of the condition offered you. If you accept it, I wish you all the satisfaction and comfort in the world of it; and I pray God of his infinite mercy to preserve you in your travels, and to send me home again my dear friend well. Fix not long with them in any place, for the gentry of France are very proud, and will soon (when acquainted) learn them to despise their tutors, however well deserving. I pray take special care how I may entertain a correspondence with you abroad.

From my House without Michel-gate Bar, in York, Oct. 8, 70.

Mr. JESSOP to Mr. WRAY.

SIR,—In answer to your last, I give you this following account of those things you inquired after, from Mr. Fisher's own mouth. A weak spirit of pismires turned borage flowers red in an instant. Vinegar did the same a little heated. This I saw.

Generally spirit of vitriol, spirit of salt, and all acid spirits, turn the leaves of herbs, flowers, and berries, of what colour soever they be, into red. Any alkali will restore them into their former colour, as was shown me in several experiments.

Pismires distilled by themselves, or with water, yield a spirit like spirit of vinegar, or rather like the spirit of *viride æris*.

Of this they have distilled great quantities, and given it inwardly and outwardly in consumptions, with good success.

Lead put into the spirit, or fair water, together with the animals themselves, being alive, makes a good *saccharum saturni*. Iron put into the spirit affords an astringent tincture, and, by repetition, a *crocus martis*.

Take *saccharum saturni* thus made, and distil it, and

it will afford the same acid spirit again, which the *saccharum saturni* made with vinegar will not do, but returns an inflammable oil with water, but nothing that is acid. And *saccharum saturni*, made with spirit of *viride æris*, doth the same in this respect with spirit of pismires, which no other acid spirit made of vegetables doth that he knows of.

But, in this particular, spirit of pismires comes nearer vinegar and spirit of nitre than oil of vitriol, spirit of salt, or the acid spirit of sal armoniac, in that it makes an astringent tincture of iron, and the others an aperient.

When you put the animals into water, you must stir them about to make them angry, and then they will spirt out their acid juice.

No animal that ever they distilled, except this, yields an acid spirit, but constantly urinous, viz. an oil and a saline spirit; and they have distilled many, viz. as flesh, fish, and insects.

They desire you to inquire whether any other animal distilled did ever yield any acid spirit.

They have made of pismires divers salts, of which you may hear more hereafter if you desire it; but at present they had not leisure to consult their notes.

As for what concerns plants, they preserve their expressed juices with some few drops of spirit of sulphur, so little as communicates no sensible taste to the juices. They also perfume the bottles with smoke of sulphur. They desire that, if you make this public, you would be pleased to suppress their names, lest the apothecaries hereabouts should know that this is the way they use.

Make a strong decoction of *Carduus benedictus;* into a quart of it put six or seven drops of spirit of sulphur, and in a few days the decoction will lose most part of its bitterness. They cannot find that the spirit of sulphur hath the same effect upon other bitter herbs. I tasted of the decoctions of wormwood, germander, feverfue, in which they said they had dropped spirit of sulphur, which were extremely bitter; but a decoction of carduus, into

which they had put the same quantity of the spirit, was almost insipid.

They have observed something in the juices of herbs as an indication of their virtues, analogous to what they have observed in urines as an indication of the diseases; and this in three particulars—the colour, the consistence, and the froth.

The colour of the juices will be of a deeper or a paler red, as hath been formerly observed.

As to the consistence, they have observed a strange variety of differences. Some will let fall their dregs very soon; others not under many weeks or months. In some the liquor that swims above will be more crass; in others more tenuious. The particulars are very many, of which you may have an account, if you think it for your purpose.

As to the froth they have observed in some herbs proper for the breast (namely, such as they used to give the juice of),—that being shaken, there arises a great froth, which stays in some many days, in some many months, before it turn to water. They named the juices of daisies, expressed from the flower and herb together, which they said frothed most of any, being a little shaken; as also ground-ivy, and others, which they held for secrets.

In one or two proper for the head, they observed little froth; they named betony.

They desire this experiment may be thoroughly tried, if you, or any of your friends, will take so much pains, because they think it may be of advantage.

They observe that some herbs, which, singly taken, do not purge, yet, mixed together, will purge strongly.

Centaury, lavender, hyssop, coltsfoot, fennel-roots, of each a like quantity, boiled together in water, and sweetened with a little honey, did violently purge two several persons, who took three spoonfuls of this decoction at morning and night, and gave them ease in a shortness of breath proceeding from a scorbutic distemper.

He desires that it may be tried, to see whether it will do the like with others. It worked not until the second day.

Mr. Fisher thinks that the small quantity of spirit of sulphur, added for the keeping of the juices, may contribute to the increase of their redness, but not altogether cause it; for he observes, that the same juices, unmixed, will grow red with standing.

October 24, 1670.

Mr. Jessop's Letter to Mr. Ray (without date).

Sir,—In answer to your last, I say, that although it pass for a general rule, that acid spirits change the juices of herbs, flowers, and berries into red, or a colour something inclining to red (for you will find a variety almost in every experiment you shall make), yet I intend not thereby that the rule should be so general as to admit of no exceptions; and yet I believe that, if the experiment be made with care, there will be found fewer exceptions than you will be apt at first to imagine. I believe Dr. Hulse's experiment upon chicory flowers might have the success you relate; for the juices of all flowers are included in a membrane, which some spirits, although they seem very acid, yet may not pierce, and so not work the effect upon the included juice. To confirm this, I remember that once we put either borage or chicory flowers, I cannot well tell which, into cold vinegar, and we could not perceive the colour to alter, although we let it stand for a considerable time; but, heating the same vinegar, and putting other flowers in, they immediately changed, the heat, as I suppose, softening the membrane, and so opening a passage for the vinegar into the juice. Mr. Boyl's experiments were made upon expressed juices, either in glass phials, which questionless is the best way, or by bruising the flower, and staining a

white paper with the juice. Those trials he made by the infusion of the flowers themselves, sometimes succeeded, and sometimes not; but I do not value any exception made against the rule, if it be grounded upon either of these two latter ways of examination; for if in a great glass full of juice of betony you can perceive but a very light *vestigium* of redness, although you hold it so that the rays of light are refracted through the whole mass, what can we then expect to see in a paper slightly moistened with that juice, or a thin leaf of a flower? You may satisfy yourself that spirit of salt hath turned blue juices red, if you please to consult Mr. Boyl's Book of Colours, Part 3, Experiments 20 and 21. There you will see it hath changed syrup of violets and juice of blue-bottles, and I doubt not but it will change also chicory flowers, though perhaps with some variety, if the trial be made as it was there.

The only general exception that Mr. Fisher knows of is, that acid spirits do not work upon juices of plants or fruits that are very acid. Juice of lemons, they say, will not change by the infusion of any acid spirit they know of,—no, not by standing long, and corruption, which will change the juices of many other fruits or plants, although they be acid. They have also made trial of white currants, but cannot perceive that acid spirits alter them. The reason, I suppose, why juices turn red by standing is, that in time, by a long fermentation, the acid spirit loosens itself from the other parts, and then works the same effect upon them which an infused spirit doth at first. I infused wallflowers in spirit of salt, as Mr. Boyl somewhere saith he did leaves of yellow roses, but could observe no change; and yet I am not satisfied fully, until I make trial of a considerable quantity of the juice. I told you that alkalies restored juices to their natural colours again, but I must recant; for although it happened to fall out so in some trials I saw made, yet they say generally they turn them into green, or at least some colour that hath some tincture of green; but yet

this rule is far from being general, as they confess, as also you may observe in reading Mr. Boyl.

As for what concerns their experiments about pismires, they give you leave to dispose of them as you think good, and do not refuse to own them. They have distilled beetles, and many sorts of *erucas*, but not bees, or any of that kind; as also fish and flesh. They desire that somebody would endeavour to rectify this spirit as highly as it is capable, by impregnating calcined *viride æris* with it several times, or some such like fixed salt, which may retain the spirit until the phlegm be raised by a gentle heat; for, unless there be some such *retinaculum*, the spirit and phlegm will rise together. If it be thus prepared, they think it will prove a very strong dissolvent. They think the best way of getting this spirit pure is by putting the insects into water, for so you have nothing but the acid juice: if you distil the animals themselves, there may perhaps something arise from the other parts of their bodies of an heterogeneous nature; but the best of all will be to try both ways, and observe the difference, if there be any.

As to what concerns the preservation of juices, they do not tie themselves strictly to spirit of sulphur, although they use it more than any other. Other acid spirits will do the same, and sometimes better for some particular herbs; and therefore they use them indifferently, according as they find, upon trial, any convenience or prejudice; and sometimes they perfume their vessels with smoke of sulphur, and sometimes not.

NOTE.—Although some of these observations and experiments of the two Fishers of Sheffield, and those that follow of Dr. Hulse's, are in the Philosophical Transactions, yet these letters, containing some other considerable observations beside these, I thought it convenient to present the reader with the letters as I found them, without mangling of them. W. D[ERHAM].

Dr. LISTER to Mr. WRAY.

DEAR FRIEND,—I am very glad Mr. Willughby is near well again, and I thank God for his recovery, and do heartily pray a continuance of good health to him. Methinks he is very valetudinary, and you have often alarmed me with his illness. My humble service to him. I thank you for the Book of Proverbs you design me. I cannot, methinks, exclude these hair-tailed insects from the family or genus of wasps, although all of them that I know are, in a strict sense, neither favicous nor gregarious, nor have artificial meat stored up for them; yet have they the shape and parts of wasps exactly, as well in the worm and chrysalis as when they are in perfection. Besides, I have observed a peculiar note belonging to the bee-kind which is not wanting in these, and that is three balls in a triangle in the forehead of them all, which nobody hitherto, that I know of, has taken notice of. But I much like the making of genuses and tribes *ex moribus et vitâ*, though I would not, as near as may be, have the form excluded. I have now seen the November book; and I find in my *adversaria* that I have formerly dug out of the ground at Burnell, in Lincolnshire, many just such-like cases, made of thin wafers, or membranes, one sticking in a direct line to another, &c. In the same place I very frequently met with little hollow balls, of the shape and size of pistol bullets, of yellow wax, wherein was one small white maggot, without any meat at all. Indeed, these balls were much tenderer than wax, and of a very fragrant smell, and perhaps might serve them as well for food as housing. If I had the table of spiders I now could make some small alterations and additions to it. I have, this last month, writ over a new copy of my History of Spiders (which is the fourth since I put my notes into any order), and inserted therein all the last summer's observations and experiments. I find only two or three

new spiders, and one to be removed into another tribe, to which it more properly belongs. When you please to send me an account of the acid liquor of pismires, I will return something concerning the gilding of a chrysalis, which is a pretty phenomenon.

I know not what to think of the uncertainty of the experiments we make concerning the bleeding of the sycamore. I have observed, almost daily, two trees, which I pierced in several places the first of November; but to this day no signs of the stirring of any juice, which indeed surprises me, we having had two or three pretty hard frosts already; yet neither at their coming, nor going away, made they any sensible alteration as to this particular. In my last year's journal I find that, particularly the 17th of December, there was a very copious bleeding; and onwards I find this memorandum, that in some great bleedings there was still to be observed a mighty reek or steam arising from the ground; and, indeed, this kind of thaw has not yet happened at York this year. I desire to know what success you have met with this year in such-like experiments.

I am glad to hear you have spared your person in not exposing yourself to I know not what inconveniences. As for the searching of the Alps once again, it would have, no doubt, been very beneficial to the commonwealth of learning, but that is enough obliged to you already.

York, December 22, —70.

Dr. Hulse to Mr. Ray.

Sir,—Yours came safe to my hand. I thank you for the experiments contained in your letter. I had thought to have tried some other experiments with pismires; but now I must stay till next spring. The juice of these insects will ferment with the powders of chalk, pearl, &c.,

as other acids do, Any blue flowers, being a little bruised, and a drop of spirit of salt, vitriol, &c. dropped upon them, do instantly turn red; but if you drop these spirits upon the surface of the flowers, whilst they remain whole and unbruised, they change not at all; and I suppose that spirit of vinegar dropped cold upon them would make no alteration, but if you heat it, then the warmth of it opens the pores of your flowers, whereby the spirit doth easily commix itself with the contained juice, and thereby presently changeth their colour; and it is probable any other acid liquor would effect the like change, if it were heated beforehand. It is probable to me, at present, the juice contained in the body of the pismire is all of it acid, and of the same nature with that included in their stings, which may appear from the spirit that is distilled from them, which surely does not all come from their stings; as likewise, if you bruise a pismire upon any blue flower, the expressed juice will tinge the flower. Now, though it be likely enough that the liquor which comes from the stings of bees, wasps, &c. being corrosive, may discolour flowers, yet I believe the juice expressed from their bodies will not do the same, though as yet I have not made trial. It may be a query whether the liquor of pismires be not stronger, and more penetrating, than any of the above-mentioned acids. If so be that the liquor dropped upon the surface of the flowers, whilst they are whole and unbruised, do turn them red, then it is manifest it is; but if the liquor be conveyed through the sting, which (the ants being angered from stirring of their hill) they thrust into the body of the flower, then the doubt will remain, because then the liquor does immediately mix itself with the juice of the flower. If so be that the weak spirit of pismires you mentioned, that immediately turned the borage flowers red, were not heated, it seems to evince that their spirit is stronger than any of the rest; but these things will be best cleared when the season of the year will permit, Your note upon Mr. Fisher's assert-

ing that any flowers turned red will be restored to the former colour by any alkali is most certainly true; and he is mistaken, as I have more than once tried.

Mr. Paschal, of Queen's College, was lately at Hackney, and has left several moulds, wherein coins have been cast, in Dr. Worthington's hand, and desired him to deliver them to you when you came to London. The Doctor desired me to acquaint you concerning them. They were digged up in Somersetshire. In my mind they are a greater rarity than the coins themselves. If you think it worth your labour, you may communicate what I have communicated to you to the Royal Society. I shall be glad to hear from you; and so, in haste, I remain.

Jan. 6, —?.

Dr. Lister to Mr. Ray.

Dear Sir,—I thank you for the account of the acid liquor of pismires, with the which I am much pleased. It is strange they should light upon no other animal that will afford an acid spirit, especially amongst insects. I had verily thought there were many such, and I yet think so, but I have not had the leisure to examine many to this end. There is a separation of an acid juice, or spirit, to be made in the analysis of vegetables mentioned by Mr. Boyle, and in Glazer: this I guess to be very much akin to the acid liquor of pismires. Quære, whether a *saccharum saturni*, made with the acid spirit of box, or oak (ex. gr. after Mr. Boyle's way), will not give us back the same spirit again? It seemeth probable it will, since the pearls seem to have separated its oiliness or soapy part. The like effect copper may have upon the rape and wine in making of verdet. To this purpose Mr. Boyle, in his last piece lately extant, tells us that spirit of vinegar, which has been fully satiated with pearls,

will cause a violet to strike a green, which is the same effect that an urinous spirit, or an alkali, works.

I will subjoin the experiment I promised you of the gilding of a chrysalis. To a strong and clear decoction of nettles put a small piece of a black gall, in time there will emerge a thin scum; if you then pass the liquor through a cap-paper, the scum left behind will exquisitely gild it. The like I have effected by other methods, and with other plants: if the experiment be well done, it will in all points look like the gilding of the stiff-haired, or prickly-nettle-feeding caterpillar's chrysalis.

I have not yet seen Redi's book, neither can I get it, though I much desire it. It is true that spiders, especially the young ones, are not very shy to shoot their threads, even in one's hand; and different kinds have many different particularities in this surprising action. As to the height they are able to mount, it is much beyond that of trees, or even the highest steeples in England. This last October the sky here upon a day was very calm and serene, and I took notice that the air was very full of webs; I forthwith mounted to the top of the highest steeple in the Minster, and could thence discern them yet exceeding high above me: some that fell, and were entangled upon the pinnacles, I took and found them to be *lupi*, which kind seldom or never enter houses, and cannot be supposed to have taken their flight from the steeples.

To tell you the truth, I begun to be at a great loss when I found that my experiments concerning the bleeding of the sycamore did not succeed this year as they did the last; for I assure you, that to this day the two trees I wounded the 1st of November have not shown the least signs of the stirring of any juice, whereas the Nottinghamshire trees had several times bled ere thus late.

You will be pleased to remember me with a Book of Proverbs, for I long to peruse it.

York, Jan. 20, 1670.

Dr. Lister to Mr. Ray.

Dear Sir,—Looking over my boxes of insects, I find a row of about a dozen of these bees, and some cases out of which they were hatched. These I find all pierced at the sides; and for the bees themselves, they differ much in bigness, as though that was not true, that insects of this kind are at their full growth when born; but it may well be, according to your observation, that these boisterous and hasty elder brothers dwarf the younger by spoiling their food.

I do not say that I ever found cases of other leaves than roses, but I have found leaves of many other trees bit out by them, as willow, thorn, and especially a lilac tree, at the upper end of St. John's Walks, had scarce a whole leaf in it; and some of those leaves, too, were well husbanded, as having two or three side pieces, and as many round bits, taken off of them. This I showed to many of our fellows, who may well remember it, as Mr. Gower, &c. And I know I have yet some of those pipe-tree leaves in some of my books, which are yet most of them at Cambridge. I sometimes use my notes and sometimes I trust to my memory, when I write to you according to leisure, which may well cause some difference in circumstances, but I assure you I am as circumspect and careful not to impose upon myself and others as I can, and you have well lessoned me to this purpose; and, amongst other things, I am extremely obliged to you for it.

As for the forking of spider threads, far be it from me that I should slight any phenomenon of nature, for I am the gladdest man that can be to hear of any; but I am very cautious not too forwardly to entertain such upon trust; neither would I have any man take them from me otherwise than as they themselves shall find them. And this is a thing that I neither formerly, nor since, have been able to observe; but if it shall be found to be done

on purpose by the animal to facilitate his flight, and not accidental (which I am the more apt to believe, because very rare), I shall be forward to return Dr. Hulse my particular thanks; but, as I writ to Mr. Oldenburgh, he might very well mistake many threads shot at a time (as is usual with many spiders, more or less), for one thread divided and forked, or, as Blancanus in Redi says, ramose, woolly, or from which many small filaments proceed; which conceit of Blancanus, I am apt to suspect, gave occasion to the Doctor to be of the same belief; but yet for the main, or mostly, as he says, he could not himself find it to be true. I have purposely omitted to insert any inquiries concerning this matter, and the poison of spiders, willingly reserving those two particulars for other papers; yet I am most glad to hear what others may more happily and more ingeniously observe and experience.

In my letter of August, which was unhappily lost (by reason, perhaps, that I had inclosed in it a plant pasted down), I quoted the express text of Aristotle, "That the thing was not unknown to the ancients;" and where he says, "That spiders dart their threads as porcupines do their quills;" which text, though very plain in itself, yet it will not easily enter into our imagination before we have made the observation by sense: witness the misinterpretation of Redi and Blancanus. And yet in the set of inquiries I sent to Mr. Oldenburgh, I have purposely given, to incite the curious, another interpretation of the text, which too, perhaps, it will bear, and not much wrested. But too much of this.

I have communicated to Mr. Oldenburgh my notes of the bleeding of the sycamore, in answer to a late letter of his. He likewise put the query to me of the pismires changing blue flowers red, which it seems somebody had sent him in. As for Mr. Jessop's and Mr. Fisher's experiments which you communicated to me, I did not send them to him as not belonging to me; but I told him there were such persons that had better examined the matter than I.

Somewhat after the receipt of yours, I found another insect, which I guess will yield an acid juice, for it most fiercely strikes the nose with a fiery and acid smell, just after the manner of the bruised bodies of pismires. This insect hath no sting, and is the long and round-bodied lead-coloured Multipeda or Iulus. Methinks the juice of that creeping Flammula about Montpellier was, as far as I remember, much like this of pismires.

My hearty humble service to Mr. Willughby. If you try the experiment of gilding, remember that the scum be suffered to become a little stiff and firm, otherwise it will be apt to break into very small pieces in the filter, and not show so well. I might inclose part of a gilt filter, but that it is so apt to break and wear off with the lightest touch.

I pity your pain, which I begin to know a little myself; but in truth I know no certainer remedy than one grain, or less, of laudanum dissolved in spirit of wine. This never failed to ease me.

I thank you for my Book of Proverbs; I am much pleased with it, but my wife will have it her book. Adieu, my dear friend.

Feb. 8, —70.

Our sycamore bled yesterday at the breaking up of a seven days' continued frost, and I am now apt to believe, if I had had the care to have made new wounds upon every like change of the weather, that our York trees would have bled before now. But I affirm no more than I have seen and tried.

Mr. Ray to Dr. Lister.

Dear Sir,—I have not yet had the fortune to strike any other trees that would bleed, besides maple, vine, sycamore, walnut, birch, and willow. I have heard that the quicken and aspen trees will sometimes bleed, but I

could never happen to wound them in that fortunate hour. Your experiment communicated to Mr. Oldenburgh, and by him imparted to us, that a bough of sycamore, maple, and walnut, when full of sap, cut off and held perpendicularly, will not drop till you cut off the tops of the twigs, and then it will, to us hath not succeeded. For a branch cut off hath begun to drop before it was topped, nor could we perceive that striking the top did at all promote the running out of the sap; though, I confess, the day when we made this trial was not very propitious to such an experiment. All that we found was, that exposing the branch to the cold wind, the end downward grew presently dry, and no sign of bleeding; but holding it in the sun, and in the beams reflected from a wall under the wind, it presently began to grow moist, and dropped through very slowly. Looking over my notes in 1668, I find thus: March 6, we sawed off a small bough of a willow, and held it perpendicularly erected; it presently dropped, and that indifferently fast considering its smallness, viz. once in fourteen pulses. This we tried in three boughs, one after another, all which dropped at the same rate, and that without cutting the tops of the branches. 10th, we experimented the same in a sycamore with like success. Notwithstanding, when I get a favorable day, I intend, with all diligence and exactness, to repeat the same experiment. I am sorry any letter of yours should miscarry, being fraught always with good notions and experiments. I long to know what plant it was you inclosed, and where, in Aristotle, I might find what you mention, and quote out of him. I have not yet tried those Iuli, which you write so fiercely strike the nose with a fiery and acid scent: I hope you will proceed to make farther experiments with them! As for the Book of Proverbs, I esteem it a toy and trifle not worth the owning; besides, there are many proverbs of my own knowledge, partly through incogitancy and partly in transcribing, omitted; many out of their due place and order, and some that want explain-

ing. If your lady think it worth her perusal, and can be content to bestow upon it some shreds of spare time, the author takes that esteem of it to proceed from her partiality to her husband's friend, rather than the merit of the work. However, I pray present my very humble service to her, and tell her I wish that I had something to present her might be worthy her acceptance. Those experiments of Dr. Hulse and Mr. Fisher about the acid juice of pismires, I myself sent to Mr. Oldenburgh to be communicated to the Royal Society.

Middleton, March 3, 1670.

Dr. Lister to Mr. Ray.

Dear Friend,—You have most ingeniously given the reason of that experiment I sent Mr. Oldenburgh, concerning the not bleeding of entire twigs, which I did after find to be the air only; the posture I held them in, that hindered their bleeding; for, if I cut a twig with my penknife, and held it up awhile, and then perpendicularly, it would not bleed; yet, if it were then topped, it would in some time show moisture, yet not always; but the bough from whence it was taken did constantly bleed, and that immediately, in case it was a bleeding time. And here I must observe to you one circumstance, that the trees I wounded at Nottingham did bleed from the same wounds five months together; but then these wounds were next a brick wall, and not exposed to the air: on the contrary, the trees I wounded here the beginning of November have never bled from those wounds then made, but from fresh ones many times. And this neglect in not making new wounds certainly was the reason of the difference, or not bleeding of these York trees when yours did in autumn.

Feb. 21.—I made many experiments upon trees by bringing them to the fire-side, and did discover many

phenomena, of which you will have an account from Mr. Oldenburgh. I made them in order to some queries I sent him formerly, and especially while saps may not be found at all seasons of the year in a much like quantity and consistence, * * * * * part of a plant, &c.

The place in Aristotle is 'Hist. Anim.' lib. ix, c. 39. "Aranei statim cùm editi sunt, fila mittunt, non intrinsecus tanquam excrementum, ut Democritus ait, sed extrinsecus de suo, corpore veluti corticem, aut more eorum quæ suos villos ejaculantur, ut Hystrices." Concerning which passage I pray see Redi, p. 170, and give me your opinion how you understand the Greek text: this interpretation is Gaza's. I will also transcribe for you Pliny upon the place, lib. xi, c. 24. "Orditur telas, tantique operis materiæ uterus ipsius sufficit; sive ita corrupta alvi natura stato tempore (ut Democrito placet); sive est quædam intus lanigera fertilitas." My sense I have set down among the queries I sent Mr. Oldenburgh. Here is a fair hint for the darting of threads, if it be not absolutely so to be understood; but, for their sailing and mounting up into the air, as yet I find the ancients were silent, and I think I was the first who acquainted you with it; but that is best known to yourself, and I challenge it only by way of emulation, not envy, there being nothing more likely than that several persons following the same studies, may many of them light upon one and the same observation. I am no Arcana man, and methinks I would have everybody free and communicative, that we may, if possible, considering the shortness of our lives, participate with posterity.

York, March 21, 1670.

Mr. Ray's Answer to Dr. Lister's last.

Most dear Friend,—Since the receipt of your last, I have fallen into a feverish distemper, which is now turned

to the yellow jaundice, a disease wherewith I was never before acquainted. It has not proceeded to any great height, and hath rendered me rather indisposed and listless than sick. I hope it is now leaving of me. This hath taken me quite off making any farther experiments upon trees; but yet I must acquaint you, that upon careful and exact trial made in branches of walnut, birch, sycamore, and willow, cut off and held perpendicularly, the cut end downwards, we found that they would all bleed entire as they were, without topping the twigs at all; neither could we find that topping of them did sensibly promote their bleeding. As for willow, we observed that the young shoots being cut clear off, and held perpendicularly as before, would drop, though from an incision made in the branch where it was cut off it would not bleed. The place of Aristotle I have not yet looked out in the Greek, nor considered. I think something might have been gathered from it to that purpose you speak of, if any one had diligently heeded and weighed it; but I doubt whether yourself, or Dr. Hulse, had any hint from it. The flying or sailing of spiders through the air is, for aught I know, your discovery; from you I had the first intimation and knowledge of it. Dr. Hulse acquainted me with no more than the shooting out their threads. I would not be so injurious to any man, especially to so esteemed a friend, as to rob him of any part of the reward of his ingenious endeavours and transfer to another what is due to him, though it be as much commendation to find out a thing by one's own industry, which hath been already discovered by another, as to invent it first; this last being rather a happiness than anything else, though I know the world will hardly be induced to believe that two men should hit upon the same discovery at the same time. You do well, in my judgment, to be free and communicative of your notions and inventions; treasuring up secrets being an argument to me of a disingenuous spirit, or of a weak stock in them that seek to get or uphold their fame thereby. Those secrets, too, for the most part,

when discovered proving to be things of no great value. If it please God I get well, I intend this week a journey into Essex. Your experiments made upon trees brought to the fire; I have as yet heard nothing of from Mr. Oldenburgh. * * * * *

Middleton, April 13, 1671.

Sir PHILIP SKIPPON to Mr. RAY.

SIR,—I should have sent you the last week the inclosed particulars which Willisell desires you to take notice of. The one is, as he says, a Salix n. d. that casts its outward bark and stands naked: it hath a remarkable Iulus. It grows near the small brook that runs into that river nigh Darking in Surrey. The other is, as he would have it called, *Veronicæ spec. Paronychiæ fol. Rut. facie* [*Veronicæ triphyllos*, Linn.] It grows at Rowtam, in Norfolk, betwixt the town and the highway, twelve miles before you come to Norwich; and at Mewell, in Suffolk, betwixt the two windmills and the warren-lodge in a wheat-ground, on the right hand of Lynn road; and in gravel-pits, two miles beyond Barton Mills, on the ridge of the hill, where a small cartway crosseth the road to Lynn. It grows also in the grass thereabout very plentifully nigh the latter end of April. Of these two I have sent samples.

He hath discovered *Helleborine flo. albo* [*Cephalanthera grandiflora*] to grow a mile on this side Greenhithe, in a valley near a church, and in the beech wood nigh Darking. He hath also found *Absinth. inod.* [*Artemisia campestris*, Linn.] a mile from Barton Mills, where a small stone standeth in the road to Lynn for to guide passengers; and in the furze bushes under the hill plentifully; and on the road to Norwich, before you come to a town called Elden, where a great road from

Lynn into the country crosseth Norwich road, and in the way on the other side of Elden, as you go up that hill towards Norwich.

Mr. Ray to Dr. Lister.

Dear and honoured Friend,—For my part, I am, God be thanked, in good health. The jaundice, which seized me here this spring, by sticking to one medicine for four or five days (that was an infusion of stone-horse dung with saffron in ale) I got pretty well rid of before I began my journey, as I think I formerly acquainted you. I believe any other medicine (of which for that disease there are good store), if I had been constant to the use of it for some time, would have wrought the same effect. One thing I cannot but wonder at in that disease, that many astringent things, as plantain-water, &c. should be good for it. I am glad that you have been prevailed with to communicate your observations and discoveries to the public. I remember you formerly acquainted me by letter, that you had found out an insect which yielded a purple tincture; but I did not then suspect it to be anything akin to the kermes kind. I have not yet found those membranous husks you mention sticking to rose-tree twigs; indeed I have not searched for them. I had thought that the kermes berry had been a blister of the bark of the oak, and not a thing merely contiguous or adhering, as a patella to a rock. I am sure the matrices of many insects bred on the leaves and branches of trees are excrescences of the plant itself; howbeit I will not say, but that they might be first caused or raised by the mother insect wounding the bark or leaf, either by puncture or distilling thereon some virulent juice. Mr. Oldenburgh hath written to me for a sight of your letter, wherein you give an account of your opinion concerning vegetable excrescences; but truly all my letters which I had here I

bound up in bundles and sent away into Essex this spring, and cannot, without some trouble, recover that particular. I desire, therefore, that you yourself would give him satisfaction and write your thoughts upon that subject again. Your Cimex feeding upon henbane I have observed, but not his eggs as yet. I cannot but wonder at your cunning and luckiness in observing and finding these things. I intend, God willing, on Monday next to begin a simpling voyage into the north, taking Thomas Willisel along with me, and to go over and view particularly myself, those plants which he hath discovered there, by me not observed, wild with us. In my return, if York lie not too much out of our road, I may chance wait upon you; till when, I shall defer what farther I have to inquire of you or communicate to you.

Middleton, June 28, 1671.

Sir Philip Skippon to Mr. Ray.

Sir,—I have inclosed the best account I can yet make of herring fishing, and shall hint some proverbs that I think are omitted in your book, viz.:

One renegado is worse than two Turks.
A Scot, a rat, and a Yarmouth herring, go all the world over.
He is a hot shot in a mustard-pot, when both his heels stand right up.
The brother had rather see the sister rich than make her so.
They go far that never turn.
The more cost the more worship.
I have dined as well as my lord mayor.
It would make a man scratch where it does not itch, to see a man live poor to die rich.
Free of her lips, free of her hips.
When fern begins to grow red, then milk is good with brown bread.
Liquorish tongue, liquorish* tail.
If it rain on Sunday before mess,—every day of the week more or less.

I believe I shall somewhat surprise you with what I have seen in a little boy, Will. Wotton, five years old the

* [Qu. Lecherous.]

last month, the son of Mr. Wotton, minister of this parish, who hath instructed this child within the last three quarters of a year in the reading of the Latin, Greek, and Hebrew languages, which he can read almost as well as English; and that tongue he could read at four years and three months old as well as most lads twice his age. I could send you many particulars about his rendering chapters and psalms out of the three learned languages into English, and his admirable memory, which it is hoped will be attended with as good a judgment and understanding. His father, I believe, will signify hereafter the great proficiency of his child, so much admired by every one that knows what he can already perform.

Sept. 18, 1671.

Dr. Lister to Mr. Ray.

Dear Sir,—I confess to you that I am not at all satisfied with the account of vegetable excrescences, because I was not able to attain the end and give any clear light to the question. Moreover, upon review, I see that the last proposition is ill expressed; that the substance or fibrous part of many vegetable excrescences not to be the food of the worms to be found in them; my meaning is, that the worms in those vegetable excrescences which produce ichneumones (to which kind of insect we would limit this proposition and expunge all other instances). These worms, I say, do not seem to devour the substance or fibrous part of them, as other worms devour the kernels of nuts, &c., but that, whatever their manner of feeding is, and we doubt not but they are nourished in and from them, the vegetable excrescences still mightily increase in bulk and rise as the worms feed.

It is observable, if we would endeavour a solution, that some of the ichneumones delight to feed upon a liquid matter, as the eggs of spiders, the juices (if not

eggs) within the bodies of young caterpillars and maggots, whence we conjecture that those of the same genus, to be found in vegetable excrescences, may in like manner suck in the juices of the equivalent parts of vegetables.

And this the dry and spongy texture of some of these kinds of excrescences seems to evince; for, if you cut in pieces a wild poppy-head for example, or the great balls of the oak, you will find in those partitions wherein these worms are lodged, nothing but a pithy substance like that of young elder: and, if there chance to be any cells unseized (which I have sometimes observed) the seeds therein will be found yet entire and perfect. Whence very probably they feed upon, or suck in by little and little the yet liquid pulp of the tender seeds, and leave the substance or fibrous parts of the seeds entire; which fibres are, as the intermediate juice is exhausted, monstrously expanded into an excrescence by the yet vegetative power of the plant.

As for matter of fact to clear the truth of that opinion, that the divers races of ichneumones are generated by their respective animal parents, and particularly that those which the various excrescences of vegetable produce are not plantigenous: I am in great hopes the instance of poppy-heads swollen into excrescences, will favour us the next season. My expectation is chiefly grounded upon the condition and nature of that plant, which is such, that nothing can pierce the skin of it and wound it but it must necessarily leave a mark of its entry, the milky juice springing upon the lightest touch, and drying or concreting suddenly into a red scar. And this I think I may affirm, that of the many heads grown into excrescences which I gathered this summer, all had these marks upon them; but our aim is here only to make way for the observation against the next season. To which purpose also we propose the following queries:

1. Whether the shagged balls of the wild rose are not excrescences from the bud and very fruit of the plant,

like as the wild poppy-heads are apparently not designed for worms, but seed?

2. Whether the large soft balls of the oak are not in like manner, the buds of the oak seized about the latter end of April or the very beginning of May; that is, whether they be not the future acorn or acorns, with all the parts of a sprouting branch thus monstrously perverted from the first intent and design of nature?

3. Upon what parts or juices the ichneumones worms thrust into caterpillars or maggots can be thought to feed? and whether there be actually eggs in caterpillars sufficient to serve them for food?

York, Oct. 25, 1671.

Sir Philip Skippon to Mr. Ray.

If this finds you at Chester, be pleased to tender my humble service to his lordship; and if you meet there with any Irish pieces of money, I desire your kindness to purchase some for me. I am very desirous to find those Elizabeth, or Pudsey shillings, Webster mentions in his 'History of Metals,' p. 21, that were made of silver ore, in Yorkshire. He says they are marked with a scallop. As you happen upon any of them, lay one or two aside for me, and I shall be obliged to you. I cannot yet send you the inscriptions concerning the 365 children and Sir Jo. Mandevil, but in lieu of them shall send you a humorsome rhyming will, of one Moore, who died not long since about Mershland, in Norfolk, and gave his estate to his grand-daughter, now married to one Mr. Shelton, a gentleman of this country, that hath a good estate near Bury.

"In the name of God. Amen. I, Thomas Moore,
The fourth year of my age above threescore,
Revoking all the wills I made before,
Making this my last and first. I do implore

Almighty God into his hands to take
My soul, which not alone himself did make,
But did redeem it with the precious blood
Of his dear Son; that title still holds good.
I next bequeath my body to the dust,
From whence it came, which is most just;
Desiring yet that I be laid close by
My eldest daughter, though I know not why.
I leave my grandchild, Martha, her full due—
My lands, and all my cattle, save a few
You shall hereafter in this schedule find
To piety or charity design'd,
Whom I my sole executrix invest
To pay my debts, and so take all the rest.
But since that she is under age, I pray
Sir Edward Walpole and her father may
The supervisors be of this my will,
Provided that my cousin Colvil still,
And Major Spensly, her assistants be;—
Four honest men are more than two or three.
Then I shall not care how soon I die,
If they'll accept it, and I'll tell you why.
There's not a man of them but is so just,
With whom almost my soul I dare to trust.
Provided she do make her son
Heir to my house at least, and half my land,
If she hath such; and when she hath so done,
She be a means to let him understand
It is my will his name be written thus—
T. A. B. C. or D. Moore *alius*."

"EPITAPH.

"Here lies in this cold monument,
As appears by his last will and testament.
He was very rich—his name was Moore;
Who ever knew poet die rich before?
But, to speak truth, his verses do show it,
He liv'd a rich man, but died a poor poet."

Mr. JESSOP to Mr. RAY.

SIR,—I showed Mr. John Fisher your letter yesterday, his brother not being at home when I went to visit them. He gives you many thanks for your account you gave him of young Helmont. He gives this account of their

menstruum, of which you inquired. The experiment was made accidentally; for having kept it in a glass phial (part of the relics of which he showed me), and going to take out some for their use, they found that it was all run out, and yet they could observe neither crack nor hole in the glass; yet observing that the glass was very white as far as it had been filled, he not imagining what might be the reason, endeavoured to cleanse it with an iron prepared for that purpose; but the glass proved so tender, that at the first touch the iron made a hole through it. Upon this they began to consider what might be the reason of this accident, for they had often made the same preparation, and yet not met with this effect. At length they remembered that they had by chance used a stronger fire than they did formerly; and therefore, upon the next occasion, after they had drawn part of it with their usual degree of heat, towards the latter end they urged it with a stronger fire, and found, according to their expectation, that what was drawn first did not dissolve glass, but the latter did. This experiment they have made four times with success, and without failing at any time. They showed me about a pint of their last extraction in a thick green glass bottle, and it seemeth to have dissolved it about half-way through. He seems to make a doubt of the meaning of those words in your query (whether the *menstruum* dissolve glass constantly and certainly); if you mean as I imagine you do, you have your answer already.

But if you ask whether the same portion of the *menstruum*, which hath formerly dissolved glass, will again do the same with the same vigour? He answers, that in this particular it doth not differ from other ordinary *menstruums;* for at the second time it works its effect more weakly, and the third time scarce discernibly, as he hath observed. If, after this account, Mr. Boyle think this a matter worth his consideration, he may absolutely command Mr. Fisher in this particular, or any other, without any conditions or reservations, as he may do all that part of the world which pretends to ingenuity and

gratitude: and yet Mr. Fisher would esteem it an exceeding great honour if he would condescend so much as to instruct him in anything. I thought it convenient to let you know that, although the account I gave you of drawing spirit of wine out of vinegar was all that either you or I received from Mr. Fisher, yet he tells me that it is not the best way (and saith he told you as much), nor the way that he useth; which, for several reasons, he yet keeps as a secret. He is busy at present about improving an experiment he hath lately made of turning the whole substance of vinegar into an urinous spirit. He let me see about half a pint that he had already done, which, both for taste and smell, was like a middle sort of spirit of hartshorn. He is endeavouring to turn the whole substance of vinegar into spirit of wine, and saith he hath hopes of good success. I should be very glad to see you here in your return from Chester.

December 18, —71.

Sir Philip Skippon to Mr. Ray.

Sir,—Some particulars I lately met with I shall here insert.

"The N. side of trees is distinguishable by quantity of thick moss growing there." Lederer's Disc. of N. America, p. 24.

In some of the late Transactions, viz. Nos. 71, 74, 76, are observables which I doubt not you have taken notice of.

"Specificâ proprietate, maniæ resistere creditur Radix nymph. lut. quæ mense majo effossa," &c. Sennertus.

"Folia Buxi, et decoctum Anagallid. flo. purp. maniam curant." Idem.

In Mr. Boyle's last piece of the Usefulness of Natural Philosophy, he tells you several ways to take the shape of a leaf, which he recommends to travellers. In a little

book called 'Polygraphice,' c. 12, is another way, viz.—"First take the leaf, and gently bruise the ribs and veins on the back side of it; afterwards wet it with linseed oil, and then press it hard upon a piece of clean white paper, and so you shall have the perfect figure of the leaf."

As anything else occurs which may be worthy your knowledge, I shall give you information. Some remarks about insects in the Philosophical Transactions bring to my memory what I read in 'New-England's Memorial,' 1633: "Plymouth was visited with an infectious fever. The spring before this sickness, there was a numerous company of flies, which were like, for bigness, unto wasps, or humble-bees. They came out of little holes in the ground, and did eat up green things, and made such a constant yelling noise, as made all the woods ring of them," p. 90.

Wrentham, Feb. 10, 167½.

Mr. Ray to Dr. Lister.

Dear Sir,—I thank you for the account you sent of the Bret [the Brill—*Rhombus vulgaris**] and Turbut [*Rhombus maximus*]. By what you write of the Bret, I perceive that what they call Bret in Lincolnshire and Yorkshire, and I believe also in all the east part of England, is the Turbut of the west country, where the name Bret is not known; and I believe the Halibut [*Hippoglossus vulgaris*†] of the west is the northern and eastern Turbut. And I would fain know how your Halibut and Turbut differ; for if there be another fish of the make and bigness of your turbut, it is a stranger to me. Our common dictionaries english *Rhombus* a Turbut; but your Bret answers better the figure so called than your Turbut doth.

* Our Brill is sometimes called the Pearl, on account of the small white pearl-like spots on the upper surface. The term bret means spotted.

† On our N. E. coast the Halibut is called a Turbot.

I am of your opinion that the Bret is the *Rhombus asper;* but what manner of fish that is you call Sandscreiter* I know not. Of this sort of flat fishes I have as yet seen only seven species, but doubt not that there are many more. Those are the Sole [*Solea vulgaris*], the Pole [*Platessa pola*], which is a kind of sole; the Halibut, which you call Turbut; the Turbut, which you call Bret; the common Plaise [*Platessa vulgaris*], or *Passer lævis vulgaris maculatus;* the Fluke or Flounder [*Platessa flesus*], called by some *Passer non maculatus,* and by others, I believe, *Rhombus fluviatilis;* and the *Passer asper sive squamosus* of Rondel, called a Dab [*Platessa limanda*] in Cornwall. We were told there of some others, viz. one they call a Lantern Fish [the Whiff, *Rhombus megastoma*], another they call a Queen. But of these things I hope to receive more full and particular satisfaction from you. As for what you have published in print, I judge it worthy of you, and think you deserve much thanks and commendation for so frankly communicating your ingenious observations and useful discoveries to the world, and will, doubtless, be recompensed with the honour due to you therefore. In one thing I am as yet of a different opinion from you, and that is the origin of those stones which we usually call petrified shells, though you want not good ground for what you assert.

Middleton, March 2, 1671.

Mr. Johnson to Mr. Ray.

Honoured Sir,—You have the head of a Fieldfare [*Turdus pilaris*] almost white, the rest of the body was not at all altered, whether it be *lusus naturæ,* old age, or some accidental cause, I know not. I have only observed

* Perhaps the Rough Dab, *Platessa limandoides.*

this change from proper colours to white in Larks which are about Carlisle, to be very usual in Titlarks [*Anthus pratensis*], which I have seen on our moors; in Crows [*Corvus corone*], whereof there is one just now in Cliffe-wood, near Peirce Bridge; in Daws [*Corvus monedula*], whereof, this year, one was at Hurworth, near Croft Bridge, which was altogether white, neb [beak], nails, and all; and in Sparrows [*Passer domesticus*], which is usual. I have sent you the little yellow bird [*Sylvia sylvicola**] you called *Regulus non-cristatus*, what bird it is I know not;† but we have great store of them each morning about sunrise, and many times a day; besides, she mounts the highest branch in the bush, and there, with bill erect, and wing hovering, she sends forth a sibilous noise like that of the grasshopper, but much shriller.

It is like enough our Whitethroat [*Curruca cinerea*] is of the *Ficedulæ;* for it is her manner with us to fall upon a fair and ripe cherry, whose skin when she hath broken, with a chirp she invites her young brood, who devour it in a moment.

Brignall, near Greta Bridge, March 29, —72.

Dr. Lister to Mr. Ray.

Dear Sir,—I shall tell you only that Kermes is this year a greater puzzle to me than I expected it would have proved. For I observe—1, That these are soft in the early spring, and very pulpy. 2. That not only that which I took to be the excrement of the bees, but also

* Called also *S. sibilatrix*, in reference to its note.

† Doubtless this bird was the *Locustella*, in Willughb. Ornith. book 2, ch. 2, sec. 5, and not the *Regulus non-cristatus*, ch. 12, which I call the Yellow Wren, and of which I have discovered three distinct species, but not one of them that sings as is here described, and as I have seen two sorts (if I mistake not) of *Locustellæ* birds do.—W[alter] D[erham].

the liquamen itself, which I took to be provision of bee-meat, is nothing else but an infinite number of small eggs, out of which a certain sort of mites (as I take them to be) are hatched. 3. That these kermes seem to be of different sorts; some having red, or carnation-coloured mites in them, wrapped up in a pure white silk; others are of white colour, &c. 4. That not only the bee maggots I described the last year have been found in these kermes, but as Dr. Johnson of Pomfret assures me, he found in one kermes one large maggot filling all the husk.

I desire to know what you and Mr. Willughby have farther observed on this subject.

Mr. OLDENBURGH's* Letter.

SIR,—After my long silence, I must now put you in mind of some particulars which were recommended to you and Mr. Ray when you were with us here. One was to communicate what you had observed concerning the *Vermis setaceus*, or Hairworm, of which Mr. Lister had made so rational a narrative already. Another, to experiment to what degree of magnitude a maggot may be advanced, by continuing to give it new flesh every two or three days, upon the occasion of Sir Sam. Tuke's relation of a maggot, which, within two months, by that way increased to the bigness of a man's thigh. A third, to try whether insects will be bred in a beef's bladder so close that no passage be left for any flyblows. And because flies may be said to have blown on the outside of the bladder, and the flyblows to have eaten through the bladder, it will be proper to include such a bladder in a case, to defend it from flyblows outwardly as well as in-

* [Memorials, p. 30.]

wardly. A fourth, to try, if occasion serveth, the virtue of *Lichen cinereus terrestris* [*Peltidea canina*, Ach.], which was said to be exceedingly efficacious in curing dogs bitten by mad dogs. A fifth, to inquire of Mr. Fisher whether he be master of the experiment of dissolving glass, and reducing it into a white calx; and after the glass is well moistened with the menstruum, whether it be capable to be shaved with a knife, almost like horn? And, farther, whether the menstruum employed for that purpose performs upon all sorts of glass?

I intreat you, sir, to present Mr. Ray with my hearty service; and, he being concerned in some of these particulars, to give him the reading of this paper.

Dr. Grew is now amongst us at Arundel House, making now and then very good observations upon plants; and having showed to the company, among divers particulars, the tracheæ mentioned by Malpighi in his 'Discourse of Vegetables,' that you have seen.

He hath been desired to endeavour whether he can discover any such thing as a peristaltic motion in plants when growing; for which purpose he hath been directed to choose some of the bigger sort, wherein that motion, if there be any such, is like to be more discernible.

We hope, sir, that you and your friend will join in making a research so considerable.

I presume you know that Mr. Boyles's essay of the 'Origin and Virtues of Gems' is now abroad; and I believe that Signor Malpighi's discourse 'De Formatione Pulli in Ovo Fœcundo, tam non Incubato quàm Incubato' will be printed in a short time. I desire very much to know that these lines are come to hand.*

London, July 6, 1672.

* [To whom this letter was addressed does not appear; probably Mr. Willughby.]

Mr. Johnson to Mr. Ray.

Honoured Sir,—I saw near Kendal, to my great wonder, a Broom-tree (if I may so say) four or five yards high, much thicker than my leg, spreading large branches every way, adorned with large fair flowers, a very fair spectacle. I found at Haughter, in the Bishopric, your *Varietas altera Jaceæ nigræ*, with the flower all white, a very pretty plant, worthy a garden.

Brignall, August 5, —72.

Dr. Lister to Mr. Ray.

Sir,—August 18 I passed through Marton Woods, under Pimco Moor, in Craven. In these woods I then found very great plenty of mushrooms, and many of them then withered, and coal-black, but others new sprung and flourishing. They are some of them of a large size, and yet few much bigger than the champignon, or ordinary red-gilled eatable mushroom, and very much of the shape of that—that is, an exactly round cap, or crown, which is thick in flesh, and open, deep gills underneath; a fleshy, and not hollow, round foot-stalk, of about six fingers' breadth above ground, and ordinarily as thick as my thumb; the foot-stalk, gills, and cap, all of a milk-white colour. If you cut any part of this mushroom, it will bleed exceeding freely and plentifully a pure white juice. Concerning which, note—

1. That the youngest did drop much more plentifully and freely than those that were at their full growth and expansion. That the dried and withered ones had no signs of milk in them that I then discerned.

2. That this milk tastes and smells like pepper, and is much hotter upon the tongue.

3. That it is not clammy or ropy to the touch.

4. That although I used the same knife to cut a hundred of them, yet I could not perceive, all that time, that the milk changed colour (as is usual with most vegetable milks) upon the knife-blade.

5. That it became, in the glass phial I drew it into, suddenly concrete and stiff, and in some days dried into a firm cake, or lump, without any serum at all.

6. That it then also, when dried, retained its keen biting taste, as it does at this day, yet not so fierce. Its colour is now of a yellowish-green, yet very pale.

7. This milk flows much faster from about the outmost rim, or part equivalent to the bark of plants, than from the more inward parts, &c.

8. I observed these mushrooms even then, when they abounded with milk (not to be endured upon our tongues), to be exceeding full of fly-maggots; and the youngest and tenderest of them were very much eaten by the small, gray, naked snail.

You can tell me what author describes this mushroom, and what he titles it.

I have revised the History of Spiders, and added this summer's notes. Also I have likewise brought into the same method the land and fresh-water snails, having this year added many species found in these northern lakes; and by way of appendix I have described all the shell-stones that I have anywhere found in England, having purposely viewed some places in Yorkshire, where there are plenty. The tables of both I purpose to send you. I am not so thoroughly stocked with sea-shells as I wish and endeavour. I aim not at exotics, but those of our own shires. Concerning St. Cuthbert's Beads, I find three species of them in Craven; and this makes it plain that they have not been the back-bone of any creature, because I find of them ramous and branched like trees.

York, October 12, 1672.

Mr. JESSOP to Mr. RAY.

SIR,—I received both yours, and am very glad to hear of your design of reviewing Mr. Willughby's Collections; and I shall give what assistance I can in the business concerning Hawks. In the mean time you may peruse Latham's 'Falconry,' whose descriptions are true, though not perhaps so full as you may expect. There are, besides these that are mentioned in the common books, a Boccarell and a Boccaret, the which, although I have often seen, yet I did not observe them so well as to be able to describe them exactly. They are the names of the male and female. A Boccarell I once kept myself, which was much larger than either the Lanner or Falcon; and yet the common tradition is, that they are a bastard Hawk, bred betwixt a Lanner and a Falcon; how true I know not.

March 14, —72.

Mr. JESSOP's Paper.

My Man William's way of making Hard Soap.

TAKE wood-ashes, and ashes of nettles or thistles (for fern-ashes make the soap soft), as much as you please; put unto them a third part of lime; make a hole in the ashes, and lay the lime in the middle of the ashes, and quench it with water or small ley; then cover it with the ashes that lie round it close, so let it lie for half a quarter of an hour, or thereabouts, till you think the lime be fallen. With a shovel mix them well together, having your fat, or tub, ready, for fear they lose their virtue. Let your fat, or tub, have a hole in the bottom; cover it with a slate-stone, or board, laid upon other little stones, which may keep it about an inch from the bottom of the tub; and over the slate-stone, or board, lay straw to

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keep the ashes from the hole. Fill the tub almost full with the ashes and lime mixed as above, and press them down pretty hard; lay a wisp of straw on the top of the ashes in the middle of the fat, to keep the water from making a hole; pour on a little water upon the wisp at first, so as it may spread in the ashes about a hand-breadth about the wisp; then pour on more than at the first, as soon as the first is drunk up by the ashes; and at the next time you may pour so much as will spread over all the tub; and if it take that without breaking the ashes, you may pour on more. If that ley which comes through the hole into your receiver at the first be not clear, put it up again, and so long continue pouring on water as the ley in the receiver will bear an egg; and this they call strong ley.

Keep this by itself, and pour on cold water again, and the next will be middle ley, which you must know by its taste. The last will be small ley, prepared after the same manner, which hath scarce any taste at all.

Take next a hundred weight of tallow; put it into the copper; put about six gallons of middle ley upon it; then put fire under the furnace, and melt it down in the ley, but so as it do not boil. Draw the fire from under it, and let it stand for four or five hours; then warm it again, and put in three or four gallons of strong ley, and so let it cool again four or five hours. Warm it again, and, if need require, put in more ley, which you will know by the sharpness of the taste of the soap: if it be pretty strong, let it boil until it become like a jelly. When it is ready for graining, if you dip your knife into it, and take out some, and let it cool, it will roll about your knife.

To grain it, or separate the ley from the soap, put in a peck of bay-salt; then keep a fire only upon one side of your copper, so that it may boil only on that side where the fire is. After it hath boiled a little, take out some of the ley, and look whether the tallow be clearly separated; if not, you must put in more salt. It must

boil till all the froth, which will rise at first a great height, be wholly fallen; then take the soap out of the ley with a scummer, and put it into a chest with a sheet under.

Take an ounce of indigo, beat it to powder, put it unto a pottle of middle ley in a little pan, and put unto it some hot soap out of the copper, so as to make it pretty thick. Let it boil; and, being hot, pour this into the middle of the soap in the chest. Whilst it is hot, stir it up and down with a stick very well, and it will make blue veins in the soap.

When it grows cold, they cut it into square cakes with wires.

Dr. LISTER to Mr. RAY.

DEAR SIR,—I am very joyful at the news you give me of your thoughts of publishing the Natural History designed by Mr. Willughby. I am very sensible of the great pains it will ask to perfect any one part of it. I only beg of you that you will let one part see the light before you undertake the next, and that they may not stay one of another. My notes are very slender upon the subject of birds.

I have very little time to bestow upon natural history, yet what pleasure I give myself is to divert myself that way, I have been at Bugthorp since I last wrote to you, to view the place of petrified shells. I shall not trouble you at present with any of my observations made there, save that I found some Star-stones branched, as I had found formerly St. Cuthbert's Beads in Craven.

This year has much changed my thoughts concerning kermes. I have found them upon old ropes and deal boards. I am pretty confident that it is an animal of the multipede kind, which does fix itself in order to the laying of its eggs; and that the eggs are laid and fastened about

its belly, just as the eggs of a cray-fish are under her tail. I have taken the animals before the fixing of themselves; but shall tell more of this ere long.

For other discoveries and experiments I refer you to a late letter I wrote to Mr. Oldenburgh, which he threatened to print in the next Transactions. When you see it, give me your opinion freely of the particulars.

York, June 20, —73.

Mr. Ray to Dr. Lister.

Dear Sir, — I received your last letter of November 11, with your accurate observations about St. Cuthbert's Beads. A strange thing it seems to me, that the broken pieces of those bodies which you find (I mean of the main stems) should be of equal bigness from top to bottom, and not at all tapering, if they be indeed the bodies of rock-plants. There are found in Malta certain stones called St. Paul's Bastoons, which I suppose were originally a sort of rock plants, like small snagged sticks, but without any joints, the trunks whereof diminish, according to the proportion of other plants, after the putting forth of their branches. Those roots that you have observed are a good argument that these stones were originally pieces of vegetables. Wonderful it is that they should be all broken, and not one plant found remaining entire; and no less wonderful that there should not at this day be found the like vegetables growing upon the submarine rocks, unless we will suppose them to grow at a great depth under water. And who knows but there may be such bodies growing on the rocks at this day, and that the fishers for coral may find of them, though, being of no use, they neglect and cast them away. Certain it is, that there is a sort of coral jointed. The small collection of local words I mentioned to you is abroad. I had sent you one of them, but that I knew not how to get it

conveyed, unless I had sent to Mr. Martin for direction; and truly the thing is so inconsiderable a trifle, that I thought it not worth the while to give him the trouble. Besides, it is so ill corrected, that I am also in that respect ashamed of it.

I am going on as fast as I can with the Ornithology. That the work may not be defective, I intend to take in all the kinds I find in books which Mr. Willughby described not, and to have a figure for all the descriptions I can procure them for. I have sent this week to Mr. Martin to begin to get some figures engraved.

Middleton, Nov. 29, —73.

Mr. Johnson to Mr. Ray.

Honoured Sir,—You desired a particular account of the Barnacles, which I have given, and am confident they are two species at the least, yet so near akin, that they have all a dark veil, covering head and neck alike.

If you have not yet determined what those shells upon old planks and ships (which antiquity fancied to be young goslings) are, give me leave to propound one conjecture among many, viz. that they are the spawn of shrimps. It was my brother Jo. Johnson's observation, who told me, that so far as his naked eye could discover, there was an exact proportion of parts betwixt the contents of those shells and the shrimp. If this conjecture have anything of probability in it, pray examine it farther; if not, pardon this trouble. The conjectural reasons which I here and there add of the parts of fowls I express positively, to avoid prolixity of words; and if in many of them I err (as like enough I may), it is not for want of ——.

Most of the Latin names I give are Jo. or Gesn., for I have not Aldrovand., though I confess sometimes their descriptions are imperfect, or do not exactly agree; and

sometimes (though rarely) I take the liberty to feign a name where I find not one.

It is commonly reported with us of the Heron [*Ardea cinerea*] and Bittoun [*Botaurus stellaris*], that they have but one wide gut, and therefore, they say, when they eat an eel, she presently goes through them, which the heron in her flight catches again and again; but when I opened them I found the story false, for they had guts like other birds for anything I saw; therefore I rather think the eel (if at all) makes her escape out of her feet.

Brignall, Jan. 15, 167¾.

I have often taken notice that the summer birds do all, or most of them, feed on such insects whose being consists mostwhat in motion—I mean who have more store of animal soul than of all the rest, and therefore afford a plentiful supply of animal spirits to the brain, and *genus nervosum* of the birds, which I sometimes fancy to be the reason why these birds are so restless in motion, and such continual singers; and perhaps some reason may be taken from hence why the *Sows* [*Oniscidæ*], and some other insects, are so beneficial to the nervous kinds, and why a greater medicinal improvement may be made of insects.

Mr. Oldenburgh to Mr. Ray.

Sir,—My worthy neighbour, Mr. Hatton, giving me a visit, acquainted me that my Lord Mordaunt hath at his house at Parson's-green, near London, some of those Barbadoes Turtles that are not bigger than larks, and that his lordship is willing to permit any artist that shall come to him in his, Mr. Hatton's, name to take a draught of that bird. If, therefore, you are minded to have that bird inserted in your History of Volatiles, it not being hitherto described, as Mr. Hatton thinks, you may give order to Mr. Martin to send some fit person to the place

mentioned to receive that satisfaction, which I could not omit to give you notice of.

London, July 11, —74.

Mr. Ray to Dr. Lister.

Dear Sir,—In the last 'Philosophical Transactions,' I saw a table of land and fresh-water snails of your drawing up, which is indeed very full and disposed in an excellent method, and the lively figure of each shell, being elegantly engraven, added; so that there is little wanting to a complete history of them. I have not been very curious in searching out and noting the varieties of our English land-snails; many of yours I have not taken notice of. The second kind I think is that you and I observed about Montpellier, but I do not remember to have seen it in England. Of your water-snails I have discovered most, if not all. Your first Buccinum, which is the 18th in the plate, I used to call *Conchula persica* for some resemblance, if I mistake not, it hath to that shell. It hath also the likeness of those they call Porcelain shells beyond seas, and use for cosmetics. I have observed a small water-snail in our brooks, which I used to term *Nerites fluviatilis* for its similitude, which I think is not in your table, unless it be the 18th; but then it is not rightly figured, for the bottom or vertex in mine is round and not at all produced. I have also observed abundantly in our brooks a *Patella fluviatilis* no broader than a lentil sticking to the stones. But of these things, being thus by you quickened, I shall hereafter, God granting life and health, take more exact notice. I thank you for your communications, and exhort you as earnestly as I can to proceed with all vigour in your search into the history and mysteries of nature; in the prosecution whereof, the success you have already had, and discoveries you have made, have both rewarded your endeavours and given you encouragement to persist.

Mr. Oldenburgh to Mr. Ray.

Sir,—My late absence from London, and other occasions, have kept me from sooner giving you the following account from Signor Boccone, in return to the letter you wrote to him, which, it seems by this his answer, was without your name to it. He saith thus in French:

L'autheur de la lettre latine tesmoigne d'avoir beaucoup de bonté pour moi, et ce ne puis luy respondre dans les formes, à cause que la dite lettre n'est point signée. Je croy pourtant de pouvoir deschiffrer l'autheur, par l'histoire de ses voiages en Sicile, et à Malthe, et de m'arrester sur la personne illustre de Monsieur Rayus. Je vous prié donc, de luy vouloir rendre mes tres-humbles reconnoissances, et de luy temoigner mes obligations; et que, s'il arrive jamais qu'il revient en Italie, je le serviray pour compagnon dans toutes les peines inevitables, qu'on rencontre dans les occasions d'herboriser.

La *Vicia sesamacea* [*Astragalus sesameus*, Linn.?] qui a esté descrite par Fab. Columna differe d'avec la *Securidaca siliquis fabaceis* [*A. bæticus*, Linn.], en beaucoup de parties; sçav. les siliques, que produit la dite *Vicia*, sont plus petites, plus aiguës, et (ce qui est le plus remarquable) attachées au caulis sans la mediation sensible du pediculus; ce qui n'arrive guere dans les parties de la *Securidaca sicula*. J'ay trouvé une figure de *Vicia sesamacea*, qui a esté tirée avec la mesme plante selon la methode prescrite par Spigelius dans son Isagoge: si vous ou M. Rayus ferez tirer la figure de la *Securidaca siliquis fabaceis* par la mesme methode, vous connoistrez d'abord par cette espece de demonstration la difference des parties. Pour le present j'ay l'honneur de vous envoier le portrait, mais avec le temps ce pourroy vous envoier la plante mesme, ou ses graines. Il me semble, que j'ay remarqué dans les 'Observations Topographiques' quelques plantes, que j'ay trouvées dans la Sicile, sçav. un

Hypericum, un *Gramen*, une *Jacea*, une *Campanula*, une *Lychnis*, et autres plantes rares. Je souhaite avoir un exemplaire de cet ouvrage, pour y expliquer, à l'occasion d'une autre impression, que ces plantes la sont les mesmes avec celles, que M. Rayus et moy avons observées et descrites. Et je dois faire cela pour rendre justice à ce sçavant voiageur, et pour empescher la multiplication des especes, estant les mesmes plantes. J'apprens avec plaisir, que le *Solanum spinosum maxime tomentosum* a esté apporté de la Virginie en Angleterre la premiere fois, cela m'ayant esté inconnu jusques icy.

So far Signor Boccone. To which I shall add something that may concern the Ornithology; which is, that I saw lately two or three sorts of East Indian birds, brought thence with the last return ships, very fine creatures; and they were: 1. A curious speckled Indian hen. 2. Some East Indian pigeons, delicately shaped. 3. Some very small birds, with short scarlet beaks, and curiously speckled feathers, &c. These, if we could learn their names and something of their nature and qualities, were very well worth, in my opinion, to be taken into your book. I hear they are shortly to be brought from Wapping (where I saw them in the company of my Lord Brouncker) to Tower-hill; and, if they be so, we may then get a draught of them, if you think fit, for the engraver, especially if the person that brought them can give us any tolerable description of them.

I cannot conclude this without giving you notice, that the Council of the Royal Society intends to engage those of the Fellows of that body, that are able and willing, to give them once a year, each of them, an experimental entertainment at their ordinary meetings, that is, some good discourse grounded on experiments made or to be made; that so their weekly meetings may be more considerable and inviting than hitherto they have been, and the work of the Society not lie altogether on the shoulders of three or four of the Fellows. And this being

to reach the absent as well as the present, I mean of those that have opportunity and ability, I do herewith intimate to you (as I have lately done to Mr. Lister), that you are looked upon as one of those which the said council have in their eye for such an exercise, desiring you that you would think upon such a subject as yourself shall judge proper for one entertainment of that company after our anniversary election-day the next year; and if your occasions should not permit you to step to London to present your discourse yourself, they have found an expedient, viz. to desire you, and such others as shall be in that case, to send it up to London to any of your friends that may present and read it for you. It is farther intended, that such discourses shall be made public if the author so think fit, not otherwise. Pray, sir, let me know that you have received this, together with your particular answer to the latter part thereof.

London, Sept. 15, —74.

Dr. LISTER to Mr. RAY.

DEAR SIR,—I am well pleased you like the Table of Snails; some things I have thought fit to alter since they were sent up; particularly the title of the third snail, which I now call, after a great collection of them, by this title, which I think will comprise all the difference, *Cochlea citrina aut Leucophæa unicolor, vel unica, vel* 2, *vel* 3, *vel* 4, *plerumque, vero quinis fasciis pullis distincta.* Again, some of the figures are unhappily mistaken by the graver, which I hope to get corrected; particularly the 19th, which I guess to be that you mean by your *Nerites fluviatilis.* This I say, if any, is that you mean; but I hope yours is a new species. I have myself figured it by the life, and indeed it was as truly designed before in the design, but I know not how monstrously mistaken by the graver in the plate. It is true, the second is that you and I found

about Montpellier; but I have found it in divers places in England since my return, in Kent, in Lincolnshire, here at Oglethorpe, in a woody bank, upon the wharf plentifully near the paper-mills. The *Patella fluviatilis* you mention is a curious discovery, and is wholly new to me; I shall look for it here if perchance it may be found in these parts.

York, October, 1674.

Dr. LISTER to Mr. RAY.

DEAR FRIEND,—I had a letter from the Barbadoes from a learned and ingenious physician of that island the other week; he practised long in Cleveland, and, in his passage this summer to the Barbadoes, gives me an account of two birds he met with at sea. I thought to ask your opinion of them. I shall transcribe that part of Dr. Town's letter to me that mentions those birds:

"One night, when the mariners were disagreeing about our distance from Barbadoes, a bird, by the seamen usually called a Booby [*Pelecanus sula*], lighted upon a man sleeping on the quarter-deck, which, from its stupidness has its name, for it sat very quietly looking about it until it was taken by a seaman's hands; and by the cry of this (which is like, and almost as loud as the sound a buck makes upon the rut) immediately came another Booby, which was taken after the same manner. And many more might have been so taken, the seamen said, had there been more about the ship; but they were welcome guests, because they put us out of doubt, as usually appearing about forty or fifty leagues from land. They are of no beauty at all, yet I will send them to you, because they are great enemies to the flying-fish. As soon as we crossed the tropic we were met by a bird called the Tropic-bird [*Phaeton æthereus*], because they commonly are first seen at twenty-two or twenty-three degrees of latitude. They are about the bigness of a parrot; the

feathers appeared white, with red intermixed; the beak crooked and of a scarlet colour; their tail at a distance not to be seen, but nigh at hand about the thickness and length of an ordinary tobacco-pipe. I wonder what their food may be so far from land, for I cannot learn that they have been observed to prey upon any fish or birds, unless they resort to some small island yet undiscovered. I heard, since I came hither, that they frequent the rocks on the windward, or eastern part, of this island; which, if true, I will endeavour to procure some," &c.

York, December 13, 1674.

Mr. Ray to Dr. Lister.

Dear Sir,—I thank you for the information sent about the birds. I have read of the one in some books of voyages, viz. the Booby, but know nothing else of it but the name. I wish I had a particular description of it, that so I might insert it in our Ornithology. The Doctor, your friend, seems to promise you the bird dried, which, when you receive, I shall beg a description of it from you.

The Tropic-bird dried I have seen in the Repository of the Royal Society, and have described as well as I can. I find it to belong to that sort of birds which I call Palmiped, with all the four toes webbed together, such as are the Cormorants [*Phalacrocorax carbo*] and Soland-goose [*Sula alba*]; and therefore, without doubt, preys upon fishes and lives only upon them. That which I observed most remarkable in it was, that the tail consisted only of two very long feathers; at least, I was informed that it had only two feathers in the tail, and there were but two left remaining in the case, which accords well with what Dr. Towne writes; yet I am suspicious, that besides those two long feathers, there are other shorter in the tail.

Having finished the History of Birds, I am now

beginning that of Fishes, wherein I shall crave your assistance, especially as to the flat cartilaginous kind, and the several sorts of Aselli [the family of the Cod-fishes, *Gadidæ*]; especially I desire information about the Cole-fish [*Merlangus carbonarius*] of Turner, which I suppose may sometimes come to York. When I was in Northumberland I saw of them salted and dried, but could not procure any of them new taken. Besides the common Cod-fish [*Morrhua vulgaris*], the Haddock [*Morrhua æglefinus*], Whiting [*Merlangus vulgaris*], and Ling [*Lota molva*], I have in Cornwall seen and described three other sorts of Aselli, from which I would gladly know whether the Cole-fish be specifically distinct. I am also at a loss about the Codling* of Turner, what manner of fish it should be, and how certainly differenced from the Cod-fish. Of the flat cartilaginous I have seen and described four or five sorts, but I am to seek what our fishermen mean by the Skate [*Raia batis*], and what by Flair [Fire-flaire, the Sting Ray, *Trygon pastinaca*], and what by Maid.† By the affinity of name one would think that the Skate should be *Squatina*, which yet I believe it is not. The sorts of Raia that I have seen and described are the Thornback, or *Raia clavata*, a certain and characteristic note of which is want of teeth. 2. The *Raia lævis vulg.* 3. *Raia lævis oculata*, with only two black spots on the back, one on each side. 4. The *Raia Oxyrhynchos.* 5. The *Rhinobatos*, or *Squatano-raia.* Rondeletius, and the following authors out of him, have many more sorts. But I have not time to add more, than that

I am, &c.

Middleton, Dec. 19, —74.

* A name for the young of the Cod-fish.

† A name bestowed on the females of several species—as Skate-maid, Homelyn-maid, Thornback-maid, &c. &c.

Mr. Oldenburgh to Mr. Ray.

Sir,—Your accurate discourse touching the Seeds, and the specific difference of Plants, was read before the Royal Society on Thursday last, and was so well received, that the President, in the name of the whole body, returns you their hearty thanks for so good an entertainment. They doubt not but that you will in good time communicate to them also what you shall farther observe concerning the seeds of bulbous plants, and the positive specific difference of plants; and they wish you much health and good success for performing what you intend in reference to the history of animals: wherein, if I could contribute anything, I would do it with great joy. I received lately from Hamborough a German description of that country in Africa, called Fetu (of which I have given some account in the last 'Transactions' of November), and found in the book bound some loose cuts which I see not that they belong to that book; amongst them were these three here inclosed, which I thought fit to send you, that you might see whether you have all the birds therein expressed, and whether you know the plants that are in one of them. That cut which is marked 1, seems to represent the *Anas arctica Clusii* [the Puffin], the eye only is different, if I mistake not. You may, when you have done with them, return them to me in a paper to Mr. Martin, to whom I spoke lately that I had gotten permission to have a draught taken of the East Indian pigeons, and the other birds, brought from those parts by Captain Erin, now living on Tower-hill, if it were worth while. But he tells me, that since we cannot have their names and peculiarities, it will be improper to insert them into your Ornithology. All that I could learn of the pigeons was, that they were Suratta pigeons, sprightly, and with extraordinary broad tails, which they spread out almost peacock-like. And as to the other birds, no more can be said of them, than what fine shape

and variegated colours they have. Having thought fit to give this notice of these creatures, I must leave it to you what use to make of it, who am, &c.

P.S.—In the above-mentioned African book there is mention made of a quadruped called Adwa, which I remember not to have met with in other authors. It is described to be no bigger than a lady's lapdog, in shape like a young roebuck, with a beautiful long head, very neat feet, short slender body.

Just when I was going to send this, I was informed that you had caused only some young ones of the little East India birds to be drawn, but that the old ones differ so much from the young ones, by their being most curiously speckled (which I hear the young ones are not), that those that know the old ones, and not the young, will hardly think them to be the same birds.

London, December 21, —74.

Dr. TOWNE's Letter about the Shark to Mr. DENT, and by him communicated to Mr. RAY.

I SEND you by this fleet the skin of a young shark-fish stuffed; you may receive it from Mr. Penn, if it come safe to him. The skin of this fish, when fresh, is so porous, especially about the head, that though never so little squeezed, it sends forth water-drops about the bigness of a small pea through its pores, and so harsh, that it wore my nails, as I was helping to flay it, to the quick almost in a moment. I believe you may now whet your knife upon it. His ventricle is without any folds in its inmost coat, or any sensible acidity, which makes me think that perhaps the philosophers do not justly attribute concoction to the famous *succus acidus* and *calor innatus*, for both of these he wants, and yet is extremely voracious, insomuch, one was taken by some of our sea-

men in a former voyage, that had in his belly a woman stitched up in a strong rug, and bit into halves, and almost digested to the bones within the compass of a very few hours; for the woman died, and was thrown overboard the same day the shark was taken.- He has usually the attendance of about two or three Pilot-fishes [*Naucrates ductor*] about a foot long, which are commonly seen to taste of the bait immediately before their master; and there are often found sticking to his side small fishes [*Echeneis remora*], which, with transverse folds upon the head and back, cling close to his skin, and I believe wait there for some little reversions that slip from his teeth. When he catcheth at a prey, he turns his belly up, thrusteth his jaw-bones forth of the skin (as you see it now), and sets his teeth upright, which, at other times, lie flat, in three, four, five, or six rows, according as his age is. I could make no more observations, the seamen urging me to rid him out of hand, thinking it a very childish thing to sit poring on a carcase. I see daily here strange plants, which, with their seeds and other toys, I would have long ago sent you, could I have got a friend that would take care of them; but as soon as may be you shall have them.

This is part of the letter I received from Dr. Towne and mentioned to you. I have the fish hanging in my hall.

Dr. Lister to Mr. Ray at Coleshill, in Warwickshire.

Dear Sir,—I received the kind token of the Ornithology with much joy: I pray for the continuance of your health, that you may with the same diligence and accurateness put forth the remaining papers. Certainly never man was so happy in a friend as he has been in you, who have been so just to his memory and labours.

I am very glad you say so much concerning the English edition,-which you tell me you intend to augment.

If I might advise you in the history of hawks, it would be very acceptable to have their managery and training, which I find is done with much skill and faithfulness in a certain late piece, called the 'Gentleman's Recreation,' printed 74, where is the best account of hawks and hawking that ever I met with.

Again, in the history of small birds, some account of the keeping and ordering of them in cages would please, which also is very well done in a late book, entitled the 'Epitome of the Art of Husbandry,' where you will find a large and very accurate tract of singing-birds; both done by experienced and judicious persons in that way.

I shall hint to you the perusal of the late 'History of the Island of Fero,' where is much said of the Puffin [*Fratercula arctica*] and that tribe.

Again, you will find a most accurate and very particular anatomy of an eagle, done by a good hand, viz. Borrichius, in his 'Vindication of Chemistry,' against Conringius, a late piece: I would you saw it, for I think it worth the inserting into your history.

If I meet with anything farther, I will give you notice of it.

The Curruca or Hedge Sparrow [*Accentor modularis*], which I have often seen, lays sea-green or pale blue eggs, which, neatly emptied and wired, fair ladies wear at their ears for pendants.

One and the same Swallow [*Hirundo rustica*], I have known, by the subtracting daily of her eggs, to have layed nineteen successively, and then to have given over.

The Bunting [*Emberiza miliaria*] breaks not oats, but shells or hulls them most dexterously, as I observe, having of them by me at this present in cages.

The Robin Redbreast [*Erythaca rubicula*] will not touch a hairy caterpillar, but will gladly take and eat any sort of smooth one that I have given to him; and there is no better way speedily to tame and make wild birds sing,

than to give them a pleasing insect or two daily; neither thin- nor thick-billed birds but will gladly eat spiders, as I have experienced in some kinds.

York, Feb. 8, —75.

Mr. DENT, of Cambridge, to Mr. RAY.

SIR,—Since my return I could not meet with any Thornbacks till upon Friday last, and then I had a male Flairmaid [*Trygon pastinaca*] and a female Thornback [*Raia clavata*]. They were so far from assisting me to perfect what I had begun, that they have given me just occasion of a great deal farther search, especially the male, which had between the fins and the tail, of each side, another tail, as the fishmonger called it, and which, he saith, all the males of flair and flairmaid, thornback and thornback-maid, have. They are not tails, but such (creatures I had like to have called them) as deserve an excellent description, and the art of an excellent graver. The extreme part, more than half way, very much resembles an eel without eyes; within an inch of the fins it grows a little smaller, the outside of each is a rima, from the extremity to that part which begins to be smaller. This rima examined and dilated (which it easily admits of, and afterwards contracts itself), that which was like the head and part of the body of an eel, seems to be an expanded webbed foot, with several remarkables in it, as a heel, a sharp-edged bone half-inch long, &c. These, called tails, seem to me like unshaped legs kneed, and joined with the bones of the fins (which may be called thigh-bones), and they to the coxendix. In each, above the rima, or rather under the fins (examining the muscles rather than expecting to find anything), I run my knife upon a vessel, which afforded a great quantity of liquor (for that part), part white, part bloody, which, being wiped off, I found seminal vessels; being more careful on the other side, I found a large vessel full of liquor, as on the former men-

tioned side. What to call this bladder or vessel, I do not yet determine: scrotum I must not, for that the testicles (very pretty to a curious eye) are within the abdomen. Whether in or nigh this vessel is one of the glandulæ prostratæ, and whether there are any vesiculæ seminariæ within these, or any other besides these, I would farther examine. I believe, but dare not assert, that the penis on each side is annexed to these vessels; some ramifications of the epididymis seem here, but not so plain as in the abdomen. While I was searching for anything that might be annexed to the foramina, which by Gesner are called foramina vulvæ (and very cunningly by Steno passed over in silence), though they are in all males as well as females, I cut with the os pubis so much as hindered the discovery whether both penises might meet or not. I am satisfied that those foramina serve only to let in water into the abdomen, as those behind the eyes let it into the mouth shut, the ten trapdoors or floodgates of the branchiæ being shut at pleasure; and this receiving in so much water, may be (if it be lawful to conjecture) by the weight of the water to make her more swift in pursuing prey, if at all, downward.

Cambridge, June 21, 1675.

Another Letter of Mr. DENT's to Mr. RAY, without date.

SIR,—I could not in my last, of the 15th instant, give you any good account of the eggs of flair or thornback, because they were very small then, and only in the vitellarium. Since that I have found a female flair with two eggs in shells in the duplex ovarium, as Dr. Needham observes in his 'Disquisitio Anatomica,' p. 202. The one I dried whole and have it by me: I opened the other and found the vitellum to be grown flat, swimming in the albumen, and with moving the egg upwards or downwards (I mean whilst whole), would easily glide through the

albumen to which end I pleased, which is easy to be seen through the shell between the light and the eye. It was pale coloured, and without any cicatricula, which I do suppose will be found hereafter in others more mature. Mr. Mayfield would persuade me that these fishes are Vivipari, for he saith, about a month or five weeks hence I shall see the fish perfectly formed in that egg-shell I doubt he is mistaken; however, I will weekly observe their several alterations, and give you a full account hereafter. The other eggs, without shells, in or upon the vitellarium, are all round; the largest about half the bigness of a tennis-ball. I boiled both parts of them in water; the vitellum grew solid, like to that of a hen's, but the albumen grew not white like the hen's egg—it grew a little more solid, but remained diaphanous. I have inclosed the shell, which does not agree with Dr. Needham's description of his *Testa Ovi Raiæ;* he saith, "Ex quatuor angulis totidem lingulæ excrescunt;' at one end it hath excrescences rather to be called *cornuæ* than *linguloe;* the other end seems more like a fin than either. What they may hereafter come to I know not; but will give you an account.

Sir Philip Skippon, from Wrentham, to Mr. Ray.

Sir,—I shall now acquaint you, that having read the Observations sent from Barbadoes, and published, No. 117 of the 'Philosophical Transactions,' I soon after discoursed about them with one Mr. Tho. Glover, an ingenious chirurgeon of these parts, who lately came from our western plantations, having lived some time in Virginia, and nine months in Barbadoes, where he says he has let above twenty negroes blood, and always observed the colour to be as florid and red as any European's blood; and that he never saw any of a dark colour, as is represented by the letter the ingenious Mr. Lister

received from that island. The difference in these two persons' observations ought therefore to be farther examined by correspondents in that and other places where blacks inhabit.

Purslain, Mr. Glover says, is also very common in Virginia, and troublesome too to the tobacco-planters. Asarum is much used by the Indians to provoke vomiting, and they are frequently troubled with violent colics, which oftentimes terminate in palsies. ****

Wrentham, Feb. 11, 167§.

Mr. RAY to Dr. LISTER.

DEAR FRIEND,—I received yours of February 8, and have resolved to follow your advice, in adding to the Ornithology an account of the ordering of birds for singing, as also something of falconry; and, besides, an epitome of the art of fowling. To this purpose I sent for the books you minded me of about those subjects. I find that the author of the 'Gentleman's Recreation,' in what I have read in him, is a mere plagiary; all that he hath concerning fowling being transcribed out of Markham's 'Art of Fowling,' without once mentioning his author, as you may soon find by comparing them. I suspect the like of his falconry. What he writes of the Haggard Falcon* is contracted out of Latham. When I shall have compared the rest with Latham and Turbervil, I shall be able to tell you whether it be not borrowed of them.

As for the tractate concerning singing-birds in the 'Epitome of the Art of Husbandry,' I do not find what is there delivered so manifestly purloined from any one author, although in Aldrovand and Olina I find the substance of most he hath; only that about the manner of breeding Canary-birds [*Fringilla canaria*] is either his

* A falcon that is not steady, but bears away its quarry down wind.

own, or borrowed of some author unknown to me. Much also he hath about the Woodlark [*Alauda arborea*], which is either of his own observation, or, as the other, taken out of some modern writer it hath not been my hap to see. This author, I believe, hath good skill in the feeding and ordering of singing-birds; yet he makes a fifth sort of Throstle, which he calls a Heath-throstle [perhaps *Turdus torquatus*], which I never saw nor heard of, nor any author besides that I know of mentions. I pray read the history of it in him, p. 92, and tell me whether any such bird be known to you. These birds, he saith, in some countries are called Mevisses. I am sure his fourth (Wood Song-throstle) is so called in Essex, and I believe elsewhere. What he writes concerning a hole left in the bottom of the nest, I remember not to have observed in such nests of this bird as I have found.

I was somewhat offended at his manner of writing concerning the Solitary Sparrow [?], as if it were a bird breeding with us in England, advising which bird to choose out of the nest to bring up, &c.; all which history makes me suspect he transcribed what he hath out of some writer, either Dutch, French, or Italian, that I have never seen, both concerning this and other singing-birds; for the Solitary Sparrow is a bird that was never seen, scarce heard of, in England, and but rare in Italy. If he were so well acquainted with them, I wish he had informed us where they breed. But enough of censure. In the 'History of the Fero Islands' I find no more species of birds than what I have already inserted in the Ornithology, partly of our own observation, and partly out of Clusius, who had an account, and better descriptions of them from Hoier than any be in this history; only here is more of the manner of climbing the rocks for taking them. Borrichi's anatomy of an eagle I have not seen; but there is also a very particular anatomy of it in Aldrovand, which I thought not fit to insert, few readers being willing to take the pains to read, much less consider,

such descriptions, unless illustrated by figures. Mr. Willughby himself hath left a myotome of a swan, and some other birds, which I thought not fit to cumber the book with.

Sutton Cofield, April 4, —76.

Mr. Ray to Dr. Lister.

Dear Sir,—I have been lately solicited to reprint my Catalogue of English Plants, partly by the bookseller, and partly by an unknown person, who sent me a letter without a name subscribed, and withal pressed me much to add to each plant the French name; whereupon I thought to have intreated you to undertake that trouble, as you are a master of the French tongue, myself being but a smatterer in that language, and wanting the conveniency of books to assist me in such an undertaking; but, upon serious consideration, concluding that those names would not render the book really much more useful, only, if well done, might add a little to the author's reputation (to the vanity of any affectation whereof I desire to be wholly mortified), I resolved not to add them, and have sent the copy up to London as it is. If you have observed any errors or mistakes therein, or have any new plants or observations to add, be pleased to send them; and though the book be already gone out of my hands, I shall take care to get them inserted in their proper places. Since my last, I compared what the 'Gentleman's Recreation' hath concerning hawking with Turbervile's Collections, and find every syllable transcribed thence. The like, I dare say, he hath done about hunting, for there is of Turbervile's a large treatise of hunting; and for fishing, doubtless, he hath done the like. I had not blamed him had he acknowledged his authors, and confessed to the world that

all he hath is nothing else but an epitome of such and such books; but now he hath basely abused the world. Mr. Oldenburgh hath published him as a considerable author, and in his preface made us believe that he hath advanced knowledge by giving us a perfect catalogue of fishes. I am sorry Mr. Oldenburgh should be so mistaken as to attribute to such a pitiful plagiary any improvement of the history of nature; but enough of him, and for this paper. I recommend you to the Divine protection and blessing, and rest, &c.

Sutton Cofield, June 14, —76.

Dr. LISTER'S Answer to Mr. RAY.

DEAR FRIEND,—I am well pleased your Catalogue of Plants is again to be printed: it certainly deserves it. You might have commanded any service in my power; but I think the addition of the French names would have been but a fancy.

I cannot say I have anything worth sending you to add. I shall only put you in mind that you leave not out the vinegar that is to be drawn from *Gallium luteum*, [*Galium verum*, Linn.] which I have tried, and is a rare experiment, and is owing, for aught I know, to Borrichius. You will see a farther account of it in the Danish Transactions.

Also you may please to remember the *Fungus piperatus* [*Agaricus piperatus*, Linn.], which I have yearly found in Marton Woods ever since.

Again, the fulminating powder, which the spikes of *Muscus Lycopod.* [*Lycopodium sp.*] yield, I have gathered much of it in Craven, and find it will fire briskly in a flame. I gathered the ears a little before they were ripe, and put them in a box, and found they shed their powder of themselves.

See more in the German Transactions, and in Olearius, of this.

As to that question of a Heath-throstle, I find that the Ring-ouzle* is so called with us in Craven, where there is everywhere in the moors plenty of them. I am glad you have discovered those authors to be plagiaries, this sort of men being the bane and pest of learning, and you ought to brand them.

I have much improved my Catalogue of Snails, having added five species thereto. I long to see you, that I might confer with you about the note I gave of this nature; for I would either put them out separately, if they deserve it, or throw them into Mr. Willughby's store, if perchance anything has escaped his diligence; but I shall resolve upon nothing till I see you. Methinks we might meet half way the latter end of the summer.

York, July 2, —76.

Mr. Ray's Answer to Dr. Lister.

Dear Sir,—Yours of July 2 came to hand. I thank you for the advices therein contained. I should, myself, have remembered and inserted the *Fungus piperatus* [*Agaricus piperatus*, Linn.], of which you formerly sent me a large account; but the experiments of the vinegar of *Gallium*, and fulminating powder of *Lycopodium*, if ever I read anything of them, were quite slipt out of my memory. I fancy that I have read something of the first in our Transactions; and the second, if it be in Olearius's Travels, I must also have read of, but, it seems, heeded not. I have not at present by me those Transactions, or other books, to which you refer, and therefore beg of you a full account of both those experiments; for I should be loth either of them should be omitted in my Catalogue,

* The Ring-ouzle is so called in Yorkshire.

which I suppose is ere now begun to be printed, though I have not yet received any proof of it. I thought it the more expedite way to give you this trouble than to stay the sending to London for those books. Your notes and observations in natural history do very well deserve to be made public, and I should advise rather by themselves than be buried in Mr. Willughby's work, the printing also of which depends upon my life and health; and, besides, it will be long before his History of Insects and Exanguia be fitted for the press, I being at present upon the History of Fishes, which will take up still a year or two's time. I have only this to object to you, and myself, against their speedy publication, that the longer they lie by you, if still you prosecute the same studies and inquiries, the more perfect and full they will be, every day almost adding or correcting, or illustrating somewhat; but if you have quite given over those researches, defer not to put them out. If it had been my hap to find out so many before unobserved particulars and experiments, I should have thought myself wanting to my own reputation had I not published them in my own name; though I confess I have always thought that, for new inventions and discoveries, we are rather beholden to a good genius, ἀγαθῷ δαίμονι, than to our own wit or industry—at least the faculty and δεινότης, or shrewdness in inventing and discovering, is a particular gift of God, and not conferred upon all. But yet those discoveries and new inventions are not granted even to such men usually, unless busied in searching and inquiring into those things. ****

Sutton Cofield, July 15, —76.

Mr. JOHNSON to Mr. RAY.

DEAR SIR,—What I said of salmon being perfect at their first return from sea, I did not mean that they were come to their utmost growth or bigness, for I think they wax for five or six years; but that they were true salmons, i. e. neither trout, scurfe, nor grey, but bigger than any of these, and bring forth young that year. In the river Tees we take notice but of two distinctions of size, viz. a salmon cock, which some call a half-fish, usually about twenty or twenty-two inches, and a whole fish, above that length. In the mouth of Eden, in Cumberland, the fishers have four distinctions of yearly growth (after the first summer, when they call them free, or frie, as we smowts, or smelts) before they come to be lackes; and this, they say, they have curiously observed, by fixing so many pins in the fins of yearlings, or two years old, and after taking them again; and thus, perhaps, in Ribble they have made the like observation, though I am a little jealous that their Sprods are but Scurves [*Salmo trutta*], their Morls [Morts, *Salmo eriox*] Greys, their Fork-tails [young salmon, *Salmo salar*] our Cocks, their half-fish, middling salmon, and their Salmons the Lacks, or overgrown salmon. I have one observation more, viz. besides what salmons are bred in our rivers, there come some years from the north (I guess when the winds are much northerly) great shoals of salmon, which often take in at the mouths of our rivers, especially if the north bar be open; and these have a broad blue spot on their heads, and are by our fishers therefore called Blue-caps. The sight of one of these makes a fisher leap for joy, especially if his gills be lousy, for then he is certain there is a great shoal, and one starves another for want of food. The manner of the breeding of eels I do not certainly know, but I think them to be oviparous; for I have several times found in one small bed of mud great numbers of very small eels, more, I am sure, than the belly of any eel could contain, lying very close together

like the young fry of other fishes. What your Cornish Butterfish [*Gunnellus vulgaris*] is I know not. I a little suspect it will prove the same with our Sea-snail, if yours melt into oil as ours do. I sent you a draught of ours long since with red chalk.

I wonder as much that fishers have not certainly determined whether salmons live upon anything save water, and what? As that horsemen have not agreed what that is the foal is said to sneeze, which they call a milt. I am apt to believe that water cannot be a competent sustenance for them. Common experience tells us that they will not only take a worm, or minnow, or other small fish, but swallow the bait with the hook down into the stomach. It is likely they take no food till what they had be digested, and possibly their stomach may digest very quickly. Farther, I think only the anglers have made the observation of finding their stomachs always empty; but I am persuaded that, if the net-fishers would open any considerable number, they would find in them food indigested, which they seldom do, but sell them whole. Perhaps I may give farther answer to this query, and some others about Whitsuntide, at which time I purpose to go to our coasts, and gather what I can. In the meantime wishing you success in your studies, I rest, &c.

Brignall, April 16, —77.

In a Letter from Mr. JOHN AUBREY to Mr. RAY.

I HAVE at length gotten my desire, viz. an able Frenchman to translate the real character of Bishop Wilkins into French. It is Dr. Lewis du Moulin, son of the eminent doctor.

London, May 7, 1678.

Mr. AUBREY to Mr. RAY.

HONOURED SIR,—I heard lately from my friend Mr. Paschal (as I often do), who tells me he hath given an account to some friends of his of some tables that might be made according to those of yours in the Bishop's Essay, and fitted to be hung up in garden-houses in the manner of maps. He desires me to advise with you if it might not be worth while to get those five (viz. 1. Herb-leaf; 2, ——; 3, Herb Seed-vessel; 4, Shrub; 5, Tree) done at London, and made public; and that if to the name of each plant were adjoined a neat cut, and to the description in the foot of the table, in English, were added the several names in English, Latin, Greek, they might become a fine ornament for summer-houses, and very useful for those who delight in that kind of knowledge. If this be approved, the like may be done for those other tables of stones and metals, and those also of insects, birds, and beasts. The same may be also put into a little pocket-book, which may be of use where the larger tables cannot be had. He adds (and Sir Christopher Wren agrees with him in it), this may do good service, to occasion the real character to be taken notice of, and the way and manner of it to be understood. He says, if this find approbation, he will take the pains to draw these out, with the description of each species, as it is in the Bishop of Chester's, and send it up, desiring that the learned contriver of those tables, Mr. Ray, may be consulted with for making such alterations and additions as he shall see cause for.

Mr. Merret (the doctor's eldest son) hath methodized the laws of England very ingeniously, *secundùm mentem Episcopi Cestriens.* which was never done before.

London, July 9, 1678.

Mr. Ray to Dr. Hans Sloane.*

Black Notley, June 8, —81.

Sir,—It is now about a fortnight since the post brought me your very civil and obliging letter, the receipt whereof I should sooner have acknowledged, but that I awaited the arrival of your acceptable present, which Mr. Smith sent me not till last week, deferring so long, I suppose, that he might send my book and that together, which, by the printer's fault, was not sooner furnished. I am too conscious of my own weakness to own what you write of me, yet look upon it as an effect of your kindness and goodwill, it being a common fault in friends to permit their affection too much to influence and bias their judgment. I am sorry that I had not leisure and opportunity when I was in London curiously to view your rare collection of plants. I know I should have received much information and satisfaction thereby. I hope you persist in your resolution of making your discoveries and observations public, for your own honour, and the advancement of real philosophy, and that you move forwards vigorously in it. I am sensible that the charge of figures may deter you, therefore I think it were adviseable to imitate Dr. Plukenet, to draw them *in piccolo*, using a small scale, and thrust many species into a plate. I would not have the ingenious deferred the fruition of such a treasure, the sight of so grateful objects, nor you the credit of your inventions.

I hope you have received the little tract which I ordered Mr. Smith to present you with a copy of. If you come down into the country this summer, I hope you will do us the kindness to give us a visit at Black Notley. My wife (who tenders her humble service to you), as well as myself, would be very glad to see you

* Memorials p. 40.

here. This, with due thanks for your many favours and great kindness, is all at present from

Sir,

Your affectionate friend and humble servant,

JOHN RAY.

For Dr. Hans Sloane, at the
Duchess of Albemarle's, in Clerkenwell, London.

Mr. RAY's Queries to Dr. TANKRED ROBINSON.

1. WHETHER the bird called Macreuse [the Scoter, *Oidemia nigra*]* at Paris be the *Anas arctica* of Clùsius, or the Manks Puffin, or a species distinct from both, perhaps a sort of Colymbus?

2. Whether the vapour ascending out of the earth, and causing an appearance of boiling in a water called the Boiling Fountain, at Peroul, near Montpellier, be inflammable by the application of a lighted candle, &c., as that is which causes the like phenomenon at Wigan, in Lancashire.

3. Of what sort of moss they make their cypress-powder, and whether of more sorts than one, at Montpellier? Either bring a sample of it, or describe it so exactly, that one may not mistake it.

4. Whether the *Chondrilla cærulea Cyani capitulis* [*Catananche cærulea*, Linn.] of Bauhinus, commonly called Sesamoides, have naturally a full or double flower, or only consisting of a pale or border of leaves, encircling a thrum of small flowers, which are vulgarly mistaken for stamina?

The like query I would make about the *Cichorium pratense vesicarium* [*Crepis vesicaria*, Linn.] of Columna, which grows in the fields about Leghorn, as the former does plentifully about Montpellier.

5. Whether the *Stœchas Citrina altera tenuifolia sive Italica*, J. B., be specifically distinct from the *Stœc. Citrina tenuifolia Narbonensis*, J. B.? It grows plentifully in the mountains of Liguria as about Gavi,

* Living on fish, Roman Catholics eat this duck on maigre days.

Voltagio, &c. To be sure of this, the best way would be to compare the plants together.

6. I observed in the borders of some fields about Leghorn a sort of trefoil, with a little spike of bright purple or red flowers, which afterwards turned to spumose vesicles, like to the head of the strawberry trefoil. Whether this be the *Trifolium folliculateum sive Vesicarium minus purpureum*, J. B.? [*T. resupinatum*, Linn.]

7. Whether the *Seseli pratense Monspeliensium* be a species distinct from our English Meadow Saxifrage? To me it seemed the same. [Both are, *Silaus pratensis*, Bess.]

8. There is a sort of *Jacea purpurea capitulo spinoso* growing on the sands a little beyond Naples, of which I desire either the seed, or a plant dried, or so exact and particular a description, as that I may know whether it be already described or not. I saw at the house of John Maria Ferro, an apothecary in Venice, living near Santa Maria Formosa, many rare dried plants, but especially a great number of figures of plants, drawn exactly by a curious hand, in black. If the said Signor Ferro be yet living, please to visit him, and inquire of him whether he designs to engrave and publish any of those icons, or be willing to part with them for their worth to one that will.

Dr. Tankred Robinson's Answer to Mr. Ray's Queries.

Sir,—In order to satisfy those queries which your curiosity and goodness were pleased to bestow upon us, we have been very industrious since our coming to Paris, but could not meet with the Macreuse, it being now out of season; and the histories which the French here do give of it are so very various, that a man knows not what to conclude from them. They all say that it is originally a fish (as some erroneously imagine our barnacles to be), and therefore the convents, and most of the inhabitants here, do generally eat it in Lent, and upon maigre days. My friend Mr. Charlton, a very curious and worthy

gentleman, hath promised me that, as soon as ever the Macreuse comes into season here, he will get it exactly designed and painted to the life, and the skin stuffed; so that then, sir, you shall have a better account of it. In the mean time be pleased to accept of the following description, which I have taken out of a late French author, not to be met withal now in booksellers' shops, the priests having forbid it I am confident it is faithful, and will afford you some light. "La Macroule ou Macreuse passe constamment à Paris, en Normandie et ailleurs pour la veritable Oye d'Ecosse."

Monsieur Tournefort, a Languedoc man, and doctor of Montpellier, demonstrates now the plants in the King's Garden here. He speaks with great veneration of you; but in his demonstration of the *Bistorta alpina* [*Polygonum viviparum*, Linn.] he dissented from you, saying that you confounded the two species together, whereas he affirmed they were really distinct. Since our coming to Paris, we have observed a few plants growing wild that may be not at all found in England, or rarely, as the *Reseda crispa Gallica* [*Reseda lutea* β, Linn.], described by Boccone; the *Conyza Canadensis annua alba acris linariæ foliis* [*Erigeron canadense*, Linn.]; *Psyllium erectum*, Bauhin. pin. [*Plantago Psyllium*, Linn.]; *Veronica erecta angustifol.*, B. pin.; *Pulmonaria maculosa*, B. pin. [*Pulmonaria officinalis*, Linn.]; *Turritis minor*, B. pin. [*Turritis hirsuta*, Linn.]; *Asclepias flore alb.*, B. pin. [*Asclepias Vincetoxacum*, Linn.]; *Sideritis hirsuta erecta*, B. pin. [*Sideritis Scordioides*, Linn.?]; *Chamædrys repens maj. vulgar.*, B. pin. [*Teucrium Chamædrys*, Linn.]; *Chamacistus plantag. fol.*, B. pin.; *Securidaca dumetorum flore vario siliquis cornic.*, B. pin.; *Fœnum Burgundiacum* [*Medicago sativa*, Linn.]; *Attractilys lutea*, B. pin. [*Carthamus lanatus*, Linn.]. Pardon, sir, the imperfect names, for we have few or no books by us, unless your travels and two or three more. No more trouble at present from.

Paris, July 12, 1683. N. S.

Mr. Ray to Dr. Robinson.

Sir,—I render you many thanks for the pains you have taken in endeavouring to resolve and satisfy me as to the query concerning the Macreuse. The description of Monsieur Graindorge is scarce sufficient to determine to what genus it belongs, much less whether it be a nondescript species. Those notes of having flat feet (and those weak and unfit for marching on land), a small flat back claw, or toe, small wings in proportion to the bulk of its body, being all over black, argue it to belong to the genus of *Colymbi*, or *Douckers;* but what he adds of the flatness of its bill, and its rising up with a high eminency, and its various colours, agree not to the *Douckers*, but rather to the *Palmipedes tridactylæ;* so that I am still at a loss about it, but yet do now conjecture it to be of the *Douckers* tribe, because it comes in the winter time, and breeds not here; whereas the *Palmipedes tridactylæ* come to us in summer, and breed with us, none appearing in our seas all winter. But if it be a *Colymbus* (as is now to me most likely), it is of a middle size, and of the caudate kind; for they only have musculous stomachs, or gizzards, and are by extremity of weather driven into our seas, and the mouths of great rivers, in winter time. What he hath of the mobility of the upper chap of its bill I believe to be a mistake. From this description I can conclude negatively, that it is not what I imagined it once to be, viz. the Puffin of the Scillies and Isle of Man. An exact picture, or the skin stuffed, when obtained, will at first sight inform us to what tribe it appertains, and whether it be already described or no.

Monsieur Tournefort is a person I have no knowledge of. When I was at Paris, Monsieur Joncquet demonstrated the plants in the King's Garden. Monsieur Marchand and Dr. Magnole, of Montpellier, were the most skilful herbarists I met with in France; but it is

now about seventeen years since I was there, and there may be some arisen of note and eminency since that time.

As to the *Bistorta alpina*, I am now come over to Mr. Tournefort's opinion, that there are two sorts thereof.

Of the plants you have observed about Paris, the *Conyza Canadensis annua alba* is improperly styled *Canadensis*, as Dr. Morison also takes notice, being frequently found in the woods and vineyards of France, and, if you will believe him, of England also, where it hath not yet been my good hap to meet with it. He entitles it *Conyza acris annua alba*, omitting the epithet of *Canadensis*.

Black Notley July 27, —83.

Dr. Robinson to Mr. Ray, from Montpellier.

Sir,—I troubled you with a letter from Paris last July, giving an account of the Macreuse. It was not so satisfactory as I wished, the bird being then out of season. However, my worthy friend, Mr. Charlton (now at Paris), will take care to get the Macreuse exactly designed to the life, together with the skin stuffed, which he intends to preserve in his own excellent museum, but will order them to be left at Mr. Faithorn's for your use. As for the queries which you have been pleased to give me about Montpellier, I am afraid that I may be defective in answering them, the present troubles of Languedoc putting a great stop to arts and sciences, there happening daily skirmishes between the king's soldiers and the Protestants of these parts; yet I have been a little industrious in the search of natural curiosities, though not so accurate as I ought to have been, especially when I intend to write to the best botanist, and the most accomplished naturalist, of this, or perhaps any, age.

1. The vapour ascending out of the earth, and causing

an appearance of boiling in the fountain of Peroul, is not in the least inflammable by the application of a torch, or candle, which I experimented several times; therefore it is of a different kind from that of Wigan, in Lancashire. This vapour rushes out of the ground so violently in some places, that I had much ado to keep a candle lighted near it. It is a perfect subterraneous wind, making the water (which we carried along with us) much colder than before it was put into the holes, which we made in the adjacent earth. A learned physician of Montpellier, then in company with me, opposed your opinion concerning the bubbling of this fountain, ascribing it to a strange fermentation between the earth and the water; but I presently convinced him, by putting several parcels of the earth into vessels, and pouring water upon them, for then we could not perceive the least disturbance in the water, which in the ditch itself was heaved up three or four inches perpendicular. I could not make any chemical experiments upon the water itself, because of its scarcity; but the inhabitants of Peroul told me that they all commonly drink of it when the hole is full, without any alteration. I am confident the vapour does not impregnate the water with any new quality, but flies through it, just as though one should blow into water with a pipe. What our most ingenious and learned countryman Mr. Lister, of York, hath lately writ of mineral waters, may (as I fancy) give some light as to the generation of this subterraneous air at Peroul. Upon putting my ear close to the ground, I perceived a great noise in the bowels of the earth, like unto the hissing of hot iron in water.

2. The perfumers at Montpellier do make their famous cypress powder generally of the moss of the green oak, for they tell me it is the most spongy, and, after washing and drying, will imbibe their perfumes better than any other moss whatsoever.

3. The *Chondrilla cærulea Cyani capitulis* [*Catananche cærulea*, Linn.] hath only a pale, or border of leaves,

encircling a thrum of small flowers. It hath no full, or double flower. M. Magnole told me that he hath frequently found about Montpellier the *Chondrilla Sesamoides, dicta cærulea, flore completo Eyst. circa fontem Piguet.* This hath a very full flower, and seems to me to differ nothing from the *Chondrilla cærulea Cyani capitulis*, but in its flower.

4. The *Seseli pratense Monspeliens.* [*Silaus pratensis*, Bess.] agrees with our English Meadow Saxifrage in every particular. I cannot find the least note of distinction.

Thus far your queries as to France, to which I will tack an observation to fill up.

I have observed the inhabitants of Languedoc to get a tar-like substance out of the *Juniperus major baccâ rufescente* [*Juniperus Oxcedrus*, Linn.], much after the same manner as pitch is got from the *Pinus* by a kind of distillation *per descensum*. This they do successfully use in curing several diseases of their cattle, especially scabs, impetigo, and such like diseases. I know a practitioner in Montpellier who frequently uses this same *resina juniperi* in cutaneous diseases; and I fancy it may prove a good medicine in some scorbutic and calculous cases, if methodically and judiciously managed.

Since my coming into Languedoc, I have observed an insect boring the *Ilex coccigera* with an instrument, or organ, coming from its belly. I know not whether it might not be conveying its eggs into the ilex, together with a venomous vehicle for the birth of the kermes. I wish I could meet the same opportunity again of making farther observations. Malpighi's 'History of Vegetable Excrescences' might be farther confirmed thereby, as that also which that excellent naturalist, Mr. Lister, essayed in the 'Philosophical Transactions' several years before Malpighi.

Since my coming to Montpellier I have seen several scorpions creeping on the walls. I think they are the same which Swammerdam hath figured in his 'History

of Insects.' Several curious persons of this city have assured me that they have killed several animals with these scorpions; so peradventure some circumstances make them differ from those of Italy, with which S. Redi might make his experiments. Animals stung by these scorpions fall generally into tremblings and convulsive motions. Their blood is always found coagulated, which may make a philosopher suspect that the venom of these scorpions, of vipers, and many other animals, may chiefly consist in a subtle acid ferment; for, besides the phenomena, we find by experience that volatile alkalies (as the volatile salt of vipers, of salt armoniac, &c.) are the most effectual remedies in these cases, as they destroy those nimble acids upon the account of texture, and free the blood from coagulations. Be pleased, sir, to pardon these imperfect miscellanies, for you may encourage thereby one that does really admire you above the rest of mankind; and is, &c.

Montpellier, Sept. 10, 1683, s. n.

Mr. Ray to Dr. Hans Sloane.

Black Notley, Feb. 11, —84.

Sir,—I thank you for your letter of Jan. 31, which I received by post, with the plants inclosed. The Fungus, upon opening the letter, unluckily slipped out, and was not minded, because not expected, and it being candle-light, and company in the room, was trod to pieces of a sudden, before I had taken out the other plants, and read so far as to know it was sent. The other two were a little crumpled, and the *Luciniæ* doubled, but without much prejudice I reduced them again to their right situation. They are both plants I had never before the good hap to see. The *Polypodium plumosum* is an elegant plant, and the leaf you sent a perfect one, and well conserved; but I am to seek for the reason of the name,

and should be glad to learn its place of growth, and more of its history, from you.

I am not sure that Mr. Newton was the first inventor of that plant I put under his name. I rather suspect Mr. Lawson might be. I mean no more by putting his name to it than that it is published in his work under that name, as I do by the names of other authors, v. g. Abies *Ger. Park.* However, he was the first showed it to me, and gave me as much as I have set down of the history of it. Dr. Plucknet's observation of the vesicles on the back side of the leaves deserves to be added to its description.

I am not positive in asserting the plant called *Homionitis* to be only a variety of *Phyllitis* [*Scolopendrium vulgare*, Linn.], and not a distinct species, but only put it down as my suspicion. You that have seen it, and know it better than I do, are better able to judge of that; but the *Hemionitis, vera Dioscoridis* of Lobel I assert to be nothing but a small *Phyllitis* growing in a shady place. Your advice concerning inserting the varieties of sundry species, especially such as are esteemed for their beauty or variety, I approve, and shall observe. Howbeit, it is not my intention to supersede the use of any approved botanic authors, but my reasons for attempting this work were—1. To satisfy the importunity of some friends who solicited me to undertake it. 2. To give some light to young students in the reading and comparing other herbarists, by correcting mistakes, and illustrating what is obscure, and extricating what is perplex and entangled, and in cutting off what is superfluous, or, under different titles, repeated for distinct. 3. To alleviate the charge of such as are not able to purchase many books; to which end I endeavour an enumeration of all the species already described and published. 4. To facilitate the learning of plants, if need be, without a guide or demonstrator, by so methodizing of them, and giving such certain and obvious characteristic notes of the genera, that it shall not be difficult for any man that

shall but attend to them, and the description, to find out infallibly any pl[ant] that shall be offered to him, especially being assisted by [the] figure of it. And, lastly, because no man of our nation hath lately attempted such a work; and those that formerly did, excepting Dr. Turner, were not sufficiently qualified for such an undertaking, and so have acquitted themselves accordingly.

I wish I had assurance, from eye-witnesses of credit, that those sorts of linen you mention are made of nettle stalks. I have heard and read the like of Scotch cloth, but dare not give credence to it, because I find not that Dr. Sibbalds, in his 'Prodromus,' makes any mention of it, and am loth to put in anything on uncertain rumour. The *Polygonum pusillo vermiculato Seopylli folio* of Lobel I do not take to be the *Erica maritima Anglica supina* [*Frankenia lævis*, Linn.], which is well known to me; but I put down such an opinion, because so reputed an herbarist as Mr. Goodyer describes the said *Erica* for that *Polygonum*, at least if I mistake not; and, to say the truth, there is nothing in Lobel's figure, description, or in the place, which contradicts it. Your sample of Lobel's *Polygonum*, if a perfect plant and well conserved, I should be glad to see. The *Erica* I hope this summer (God willing) to see growing in its natural place. I am in doubt whether the *Polygonifolia per terram sparsa*, &c. belong to this tribe, or rather to the *Asperifolia*. That its spike of flowers is so reflected and turned as theirs are I can assure you, and I think it hath a perfect flower.

The *Blitum Americanum spinosum* is a plant to me unknown. I am as yet doubtful of the characteristic note of the Garden Blite.

The 'Hortus Farnesianus,' said and supposed to be written by Tobias Aldinus, but indeed Petrus Castellus his work, as appears by his name in capital letters in some preface or epistle to the book, I have not, and should be glad to see.

I render you many thanks for your assistance and com-

munications, and shall, with an honorable mention of you, own what I have or shall receive from you. I rest,

Sir,

Your very humble servant.

JOHN RAY.

For his honoured friend Dr. Sloane,
at Mr. Wilkinson's, bookseller, at the Black Boy,
over against St. Dunstan's Church, in Fleet-street, London.

Dr. T. ROBINSON to Mr. RAY.

SIR,—Some of your queries are so extremely curious, and so severely nice, that neither I, nor the best botanists or naturalists (that I have met withal beyond sea) can satisfy such critical thoughts. I am overjoyed that so vast a memory, so exact a judgment, and so universal a knowledge, will be employed in compiling a general history of plants, an undertaking fit only for your extraordinary talents. I am in great hopes (because I wish it very impatiently) that you will bestow on the world a general history of nature (if God Almighty bless you with health and a long life); it is very defective at present, and seems to call for method and perfection from you.

M. Marchand is dead at Paris, so is Zanoni at Bononia, and John Maria Ferro at Venice. The three volumes of dried plants, and that other of designs, are now in the hands of his sons, at Venice. I viewed them several times, and offered twenty pistoles (which I thought to be their full value) for them; but my money and fair words were despised, the jealous Italians keeping them like so many wives. Signor Zanoni hath figured many of them in his 'Histor. Botan.,' which I have sent to London, where you may command it if you want it. M. Magnole's Catalogue lies also at Mr. Faithorn's at your service.

I perceive the Academy Royal at Paris goes on with their design of publishing a general history of plants, of

which M. Dodart printed some years ago the scheme and model; for I saw two or three small folios of this history in several bibliotheces at Rome, which I never met withal in the shops at Paris, because I suppose it will not be sold till all the volumes are perfected. I have several things to object against this mighty French work, designed rather for the glory of the monarch than the use of the subject. If you had their encouragement, I am sure your work would be far more satisfactory and advantageous than theirs, which, in my poor opinion, will be like a great palace full of fine ornaments, but wanting order, necessary conveniences, and regular structure.

I had several conferences with S. Malpighi at Bononia, who expressed a great respect for you, and is not a little proud of the character you gave him in your 'Method. Plantar. nov.,' which book I had presented him withal a day before. He honoured me with two visits at my inn, where once he took occasion to be a little angry with Dr. Lister (whose history he had by him), for his opinion of the origin of stones and shells resembling animal bodies. He is very positive that he can demonstrate against the doctor, having been very industrious upon that subject when he passed the Italian mountains, and when he was in Sicily and Malta. Besides, he showed me several letters sent lately from Bishop Steno (who, after a pilgrimage to Loretto, got that preferment of the Great Duke), now at Florence, concerning that hypothesis, all which put him into some passion against our sagacious countryman, though he professed himself a great admirer of Dr. Lister. I took occasion, from this, to interpret some passages and discourses in your travels relating to this point, which pleased Malpighi to that degree, that he smiled to see you inclined to his opinion. Just as I left Bononia, I had a lamentable spectacle of Malpighi's house all in flames, occasioned by the negligence of his old wife. All his pictures, furniture, books, and manuscripts were burnt. I saw him in the very heat of the calamity,

and methoughts I never beheld so much Christian patience and philosophy in any man before; for he comforted his wife, and condoled nothing but the loss of his papers, which are more lamented than the Alexandrian Library, or Bartholine's Bibliothece, at Copenhagen.

In my journey from Rome to Naples, I observed that plant commonly called in the physic garden *Ficus Indica* [*Cactus opuntia*, Linn.] growing very plentifully on the hill side near the Tre Taberne, as also near the ruins of Old Anxur, and in several other places near the Via Appia, so that it appeared to me like a common wild plant in that country. Afterwards I rode through great woods of cork trees, more especially near Fundi and Old Formiæ.

I remember very well I took notice of the Sardina and Sardone* at Rome, calling them always at dinner pilchard and herring. All the English were of my opinion. If I had had your query then, I would have been more curious. I cannot think of any difference, only that which you intimate, magnitude.

Geneve, April 18, —84, s. n.

Dr. Robinson to Mr. Ray.

Sir,—Most of our herbarists in these parts are employed at present in carrying on the 'Hortus Malabaricus.' The fifth volume is ready to come forth, and eight more are designed—a mighty work of thirteen volumes. Breynius labours hard upon his second century of exotics; and I am told that M. Tournefort intends to publish a history of some rare plants observed by himself on the Alps and Pyrenean Hills. The Academy Royal at Paris does also go on with their

* Distinct from herring and pilchard.

general history of plants, but I long for nothing but yours, which I hope is now under the press. I question not in the least but you have all the encouragement that the learned part of the world can possibly give you.

When I was in Italy, I observed many operators there to make great varieties of sapos and balsams out of the salts and oils of vegetables. They proceeded much after the same manner as you have set down in your 'Observ.' pp. 202, 203 (only adding now and then a few odoriferous ingredients), viz. by uniting the salt and oil of the same vegetable by the help of slaked lime. Without this latter ingredient the union would be difficult, for I have known several miscarry by omitting it. By this process we have the entire complexion of a vegetable under the form of a sapo or balsam (especially if, instead of common water for the lixivium, we make use of the distilled water of the plant), a composition, peradventure, as beneficial to mankind as any other whatsoever. The little experience that I have had in the world hath sufficiently convinced me (though I am unhappily a little inclined to scepticism and incredulity) of its successful and unexpected efficacy in many cases, internally given in proper vehicles, and dosed *pro re natâ, præmissis præmittendis*, as also externally applied, v. g. in icterical, arthritical, scorbutical, and nephritical cases; in several nervous and cephalic distempers (more especially the palsy and lethargy), in correcting and destroying all sorts of poisons. I speak experimentally of the sapos, or balsams (made as beforementioned), of the *Hypericum*, *Juniperus*, and *Abies*, though I do not doubt but the same may be expected from many other vegetable compositions of the like nature. I am so short upon this particular, by reason of your extraordinary sagacity and great talents.

The *cortex exterior*, or outward skin of Seville oranges, dried, powdered, and given every three hours in electuar. or white wine, is no mean specific in intermittent fevers (even in quartans themselves), dose ʒj. to ʒij. Next to the Quinquina, or Jesuit's-bark, I believe it may be one

of the best alterative medicines yet commonly known. I beg, sir, a few of your thoughts concerning the quinquina, as to the place of its growth and its history. Peradventure it may be an East Indian drug, and brought from the Moluccas to Peru. I am much in the dark, and want some of your learned communications about it. What Bartholine and Signor Badi have writ of it does not satisfy.

When I was at Rome, I observed many times two fathers, belonging to the public elaboratories there, to gather up and down, in the villas and gardens, the gum and resin of the cypress, as also to get an oily substance from the wood by a kind of distillation *per descensum*. Upon my inquiry, the fathers were so obliging as to tell me that out of this resin they prepared a lacca, which, being superficially spread and dried over any body, would preserve it fresh to the end of the world. The preparation is thus. After having distilled a sufficient quantity of liquor from the resin, they cohobate that distilled spirit on the remaining part of the gum (left in the retort), which, by a gentle digestion, dissolves, and becomes a lacca. I told the fathers that the very same preparation out of amber, turpentine, or mastich, might serve as well for that purpose. However, I was very thankful for their kind communication.

In the kingdom of Naples I saw great plantations of the *Gossipium*, or *Xylon* (observed by yourself in Malta). The Neapolitans use the *Lanugo* very successfully in the piles, internally as well as externally, which I had once an opportunity to remark.

Leyden, June 4, —84, N. S.

Mr. Ray to Dr. Robinson.

Sir,—The 'Hortus Malabaricus,' which the Dutch herbarists are so busy in carrying on, is too pompous

and costly a work, and not to be purchased by mean persons. They might have thrust it into a quarter of the compass, and rendered it more useful. The like may be said of Breynius's book. Monsieur Tournefort's history I long to see, not doubting but it will answer my expectation of it.

As for my intended history, I am now sensible I have undertaken a task beyond my strength, and yet it is *res integra*. I have not yet proceeded so far but I can, without inconvenience, give it over; but yours, and some other friends' opinions of, and expectations from me, do inspire me with such force and courage as not to despair of my abilities, but to contemn all difficulties, and contend even to excel and outdo myself. I had some expectation of Dr. Morison's work; but finding myself much frustrated therein, and likewise a stop at present put to his proceedings, though it be out of my way, and belong not to my profession, yet because there is no man that I know of, of our nation (as indeed neither is Dr. Morison) competently qualified, either engaged in or designing of such a work, I was more inclinable to listen to the solicitations of my friends putting me upon it. That, whereas those of other nations beyond the seas are busy and active in this kind, it might appear that the English are not altogether idle or asleep, but do, at least, endeavour to contribute something to the promoting and cultivating so pleasant and useful a knowledge. I do not intend to begin to print, or so much as procure, or engrave figures, till I have finished the whole work, to avoid (as much as may be) omissions, misplacings, and appendixes, and for some other reasons.

Your remarks upon the sapos of plants I was much pleased with. I did never reflect upon them, nor consider of how great use this might possibly be.

I am a great stranger in the history of the Jesuit's-powder, and therefore not likely to give you any light thereinto.

Your observation concerning the rind of Seville oranges

being a specific against agues, puts me in mind of a prescription I had from a physician in Nottinghamshire, to prevent, or divert the fit of an ague, viz. a Seville orange entire, rind and all, eaten up, an hour, as I remember, before the accession.

Though the *Ficus indica* [*Cactus opuntia*, Linn.] be so frequently found growing plentifully in Italy, that one would be apt to think it were a native of that country, yet doubtless it is originally a stranger and an American, and was first planted there wheresoever it is found, where probably afterward it might propagate itself by seed; as is also the *Conyza acris alba canadensis annua* [*Erigeron canadense*, Linn.], which yourself and some others have observed to grow as a wild plant about Paris.

Black Notley, June 16, —84.

Dr. Robinson to Mr. Ray.

Sir,—I have sent you two Macreuses, male and female, and hope they will come safe to Black Notley. My ingenious and worthy friend Mr. Charlton (now at London) procured them for me at Paris, who hath them both designed to the life in proper colours by the most accurate hand in France. If you saw the pictures, I believe they would give you a better insight than these skins, which are a little broke and changed; yet nevertheless your most discerning faculties may discover that in the dark which few can distinguish at noonday. This Parisian bird (very famous of late) may be no unwelcome subject, it being in Lent, and upon maigre days, the greatest dainty of convents. I have been told by several of the most learned priests beyond sea, that the Macreuse was as much a fish as the barnacle (and indeed I am of the same opinion), that the blood was the same in every quality with that of fishes; as also the fat, which (as

they falsely affirm) will not fix, dry, or grow hard, but always remains in an oily consistence. Upon these and other reasons the Sorbonists have ranked the Macreuse in the classis of fishes. For the rest, I refer you to my paper from Paris, and impatiently wait for your judgment, for which I have a particular esteem.

London, August 1, —84.

Mr. Ray to Dr. Robinson.

Sir,—I received the box with the cases of the male and female Macreuse you were pleased to procure and send me, for which I hold myself very much obliged to you.

I had no sooner opened the box, but instantly I found that the Macreuse was no stranger to me, though unknown by that name. I was very much pleased to be so suddenly rid of my long continued scruples about it, and not a little surprised, when I found it to be another kind of bird than I imagined. A particular description of the cock you may find in Mr. Willughby's 'Ornithology,' p. 366, of the English edition, among the sea-ducks, to which kind this bird belongs, and not to the divers, or douckers (*Mergi* or *Colymbi*), as I falsely fancied to myself.

Mr. Graindorge's description, which you sent me a breviat of, I find, upon attent reading and comparing it with the case of the bird, and mine own description, to be very faithful, and sufficient to lead into the knowledge of it one that had not been prepossessed with a strong opinion that it was of another kind, as I have already intimated myself to have been. Had there been but one word added, that it was of the duck-kind, I should then presently have apprehended what bird it was; and yet there was enough in the description (had I not been blinded with prejudice, and so lightly passed it over, and not heeded it) to determine its genus, at least, and to ex-

clude it from those of the *Mergi* and *Colymbi;* and that was, that it had a flat bill, which is a note common to no other birds that I know of but the goose and duck-kinds. Notwithstanding what he saith of the debility of its feet unfit for walking on land, I see not but that it may march as well as the rest of its kind; all which have but short and weak legs in proportion to the bulk of their bodies, and those also situate very backward. What he saith of the smallness and weakness of the wings, and shortness of their feathers, is common to many sea-fowl, viz. the *Tridactylæ* and *Mergi,* which yet by the nimble agitation of them fly very swiftly and strongly. What he saith of the mobility of the upper mandible of the jaw, I shall not be too hasty to believe, as in a former letter I remember to have written.

Now though this bird happened to be known to me by another name, yet is it so rare and uncommon, that I take it not to have been described by any that have written the history of birds before; though, as I remember, the name of Macreuse is mentioned by Gesner or Aldrovand, or both. Why they of the church of Rome should allow this bird to be eaten in Lent, and upon other fasting days, more than others of this kind, but especially the *Tridactylæ,* I see no reason: the flesh of these last, which live only or chiefly by preying upon fish properly so called, tasting stronger of fish than that of any ducks which feed upon shell-fish. Many birds of the duck-kind, which, as I said, all feed, partly at least, upon shell-fish (as Monsieur Graindorge found the Macreuse also to do), have a delicate and well-tasted flesh; as for example, the common Mallard [male of the Wild Duck, *Anas boschas*], and Teal [*Anas crecca*]; whereas the flesh of all those kinds that feed wholly or chiefly upon fish, properly so called, is of a rank, ferine, and piscose taste; as for example, that of the Soland Goose [*Sula alba*], the English Puffin [*Fratercula arctica*], and those of the tridactylous kind; so that only the young ones of those kinds are

admitted to our tables. I observed in this bird, and in some others of the sea-ducks, which are much under water, that they want that vessel, or ampulla, situate in the very angle of the divarication of the windpipe, which, for want of a better and fitter name, we are wont to call the labyrinth of the trachea; which, though being common also to the *Colymbi*, which of all birds dive most and continue longest under water, we may very probably from thence conclude that the labyrinth doth not serve them for a reservatory of air, to enable them to continue the longer under water, as I sometimes conjectured, but for the intending or modulating of the voice, seeing in the plash-ducks the females want it. But I am somewhat to seek about the use of this vessel, and I think it were worth the while to examine what sorts of birds have it, what want it; and in those sorts that have it, whether the males only, or in some the females also. I observed it in the *Mergus cirratus longiroster major*, or the Dun-diver [*Mergus serrator*], and that very large and extended by very strong bones; and yet I thought myself to have sufficient reason to judge that bird to be the female of the Merganser [*Mergus serrator*]; but I dare not be confident that it is a female, because of this labyrinth. And now that I am writing of birds, I propose it to your consideration, whether that sort of bird, mentioned by Dr. Plot to be often heard in Woodstock-park, from the noise it makes, commonly called the Woodcracker [*Woodhacker, Woodpecker*], be not the lesser sort of *Picus martius varius?* For since the publishing of Mr. Willughby's 'Ornithology,' I have observed that bird sitting on the top of an oaken tree, making with her bill such a cracking or snapping noise, as we heard a long way off, the several snaps or cracks succeeding one another with that extraordinary swiftness that we could but wonder at it; but how she made the noise, whether by the nimble agitation of her bill to and fro in the rift of the bough, or by the swift striking of the mandibles one against another, as the stork doth, I cannot

clearly discern; but an intelligent gentleman, who was very diligent in observing the same bird, said it was the former way.

Black Notley, Aug. 13, —84.

Dr. ROBINSON to Mr. RAY.

SIR,—My own private common-place books do afford some odd, and, as I think, useful observations and experiments upon plants, especially those called, and vulgarly esteemed, poisonous ones; which, if judiciously mixed, prepared, and managed, may prove the most powerful and beneficial medicines in nature, I mean internally given; for they may be so ordered as to work very agreeably, what way soever one pleases, as by vomit, stool, or else by sweat only, and urine, or else insensibly, and not without such success as can scarce be expected from any other vegetables, or from any animal or mineral substances whatsoever; but I will defer this to a particular paper, having not at present my notes and records of my trials by me.

London, August 29, —84.

Mr. RAY to Dr. ROBINSON.

SIR,—Much controversy hath of late been concerning the origin of those shell-like stones found in the earth, either scattered or amassed, in many places both in England and beyond the seas: that they were the very shells of some sea-fish or got this figure by being cast in some animal mould, is the opinion I have declared myself to be most inclinable to, as you may see in my Travels at large, from p. 113 to p. 131. In favour whereof I shall add farther:

1. That there are whole beds of the very shells themselves unpetrified found in the earth, and that not only in plains and hillocks, such as the Apulian about Andria, and the Tuscan about Volterra, may be supposed to be, but in mountains of a considerable height. Christianus Mentzelius, in his discourse concerning the *Bononian Phosphorus Lapis*, gives us a relation of many beds of them found mingled with sand in the upper part of a high mountain not far from Bologna, in Italy. His words are these:—"Non procul monti Paterno dicto, lapidis Bononiensis patriæ, unico fortè milliari Italico distanti (loci nomen excidit memoriâ), ingens mons imminet præruptus à violentiâ torrentium aquarum, quas imbres frequentes ex vicinis montibus confluentes efficiunt, atque insignes terrarum moles ab isto monte prosternunt ac dejiciunt. In hâc montis ruinâ, superiore in parte visuntur multæ strages seriésve ex testis conchyliorum omnis generis plurimâ arenâ interjectâ, instar strati super stratum (ut Chymicorum vulgus loquitur). Est enim inter hasce testarum conchyliorum strages seriésve arena ad crassitiem ulnæ et ultrà interposita. Erant autem testæ variorum conchyliorum, omnes ab invicem distinctæ, nec cuiquam lapidi impactæ, adeò ut separatim omnia manibus tractari et dignosci potuerint. Effecerat hoc arena pura, nullo limo lutóve intermixta, quæ conchyliorum testas conservaverat per multa secula integras. Interea verò diuturnitate temporis omnes istæ testæ erant in albissimam calcem facilè resolubiles tanquam vehementiâ ignis calcinatæ."

Now if the shells themselves, not petrified, be found in such plenty lying in beds, and that near the tops of high mountains, a great argument it is, that what stones we find of like form, and in like places, were anciently shells too. This argument is so much the more considerable, because it frustrates one main objection against our opinion, viz. because no account can be given how the very shells should be brought to the tops of mountains, they being so high above the level of the sea; for when

as we see the thing done, it is vain to dispute against it from the unlikelihood of the doing it. But yet we may give the same account of the original of this bed of shells, perhaps one hundred feet above the level of the surface of the sea, as we have elsewhere given of that bed of sand and cockle-shells found in sinking a well at Amsterdam, at perchance near one hundred feet deep below the present bottom of the sea; to wit, that both the one and the other were of old time the bottom of the sea, and afterwards covered by several coats, or floors of earth, brought down from the mountains in land-floods; the several beds or floors to be seen in such broken mountains being the several settlings of particular floods.

2. Some other bodies, besides shells, commonly esteemed stones, there are found in the earth, resembling the teeth and other bones of fishes, which are so manifestly the very things they are thought only to resemble, that it seems to me great weakness in any man to deny it. Such are the *Glossopetræ* dug up in Malta in such quantities, that you may buy them by measure and not by tale; and also the vertebres of thornbacks, or other cartilaginous fishes there found, and sold for stones among the *Glossopetræ*, which have no greater dissimilitude to the teeth of a living shark, or the vertebres of a quick thornback, than lying so long in the earth, as they must needs have done, will necessarily induce. Now in this same isle of Malta we found also many shell-like stones, which why we should not esteem to have been originally the shells of fishes I see no reason; for if in one and the same place we find many teeth and bones of fishes entire and unpetrified, and likewise stones exactly imitating the shells of other fishes, a great presumption to me it is that these were originally the things whose shape only they now seem to bear. Neither are these *Glossopetræ* found only in Malta, but also in many places of Germany, far remote from the sea, in a hill near Aken, in so great plenty that Goropius makes it an argument they could not be the teeth of sharks. "In colle illo," saith he,

"qui Aquis-grano imminet, tantum id genus fuisse piscium quis crederet, quantum de Glossopetrarum copiâ conjectari deberet?"

3. It seems strange to me, that if these bodies were formed after the manner of the shooting or crystallizing of salts, it should happen that two shells should be so adapted together at the heel, and shoot out to the same extension round, and the upper and nether valve be of different figure, as in natural shells, and that not only in one or two rarely to be found, but in multitudes of them.

4. Why should not nature as well imitate other natural bodies, or their parts, as the horns and hoofs of land animals, or the nuts and seeds of plants, as the shells and bones only of some sea-fishes.

5. Were these bodies produced by a concretion of salts, it seems strange to me that there should be such great variety of them, and their shapes so regular and exactly circumscribed; so great a diversity of figures arguing a greater variety of salts, or of the modifications and mixtures of salts, than are likely to be found in nature; and the curvilineous concretions of salts never, that I have yet seen, appearing in that regularity of figure and due circumscription as in these bodies, which is an argument that the government of some principle superior to matter figured and moved in their formation.

6. Were these bodies nothing but concretions of salts, it seems no less strange that so many liquors impregnated with all sorts of salts and mineral juices in all proportions, having been at one time or other industriously or accidentally exposed to crystallize and let stand long in vessels, there should never be found in them any such concretions; for, if any had happened, we should doubtless have heard of them, and the observers would have improved such an experiment to the production of the like bodies at their pleasure, which would have been a sufficient refutation of the opinion I incline to.

Some of the arguments against this opinion admit of an easy solution. Others I do not see any way as yet to

answer, but by granting that many sorts of shells are wholly lost, or at least out of our seas. Others, as the three last of Dr. Plot, do hitherto puzzle me, and put me to a stand.

As for what Dr. Plot produces out of Camden and Childrey, in confirmation of his fourth argument, viz. that the *Ophiomorphites* of Cainesham have some of them heads, I doubt not but it is a mistake, proceeding from their credulity. For Mr. Willughby and myself inquiring diligently there after such stones, the common people affirmed that there were such found: we not satisfied with their assertion, but desirous ourselves to see them, were at last directed to a man's house who was said to have one, to whom when we came, he showed us the stone, which indeed at the upper extreme had some kind of knob or protuberance of stone, but not at all resembling the head of any animal. Such a kind of stone might, perhaps, be shown to Mr. Camden, whose fancy being possessed with the vulgar conceit, he might without any strict view or examination of it, admit it to be what the vulgar would have it.

That the species of *Brontiæ* cannot be the petrified shells of *Echini Spatagi*, the arguments Dr. Plot alleges out of Aristotle and Rondeletius do not evince; for, though in some seas they may be πελάγιοι and ἀπάνιοι, yet in others are they plentiful enough. In our own seas at Llandhwyn, in the Isle of Anglesey, we may reasonably conjecture they are more plentiful than the common *Echini* anywhere with us, because we found more of their shells cast up there on the shore than of the *Echini* on any shore about England. And though their bristles or prickles were indeed but small, yet were they not few, or thin set, as Rondeletius saith.

I thank you for your last letter and the information and advices therein given. As to the particular of figures, I find that others are of a different opinion from you, looking upon an history of plants without figures as a book of geography without maps. A good figure conveys

that to the mind suddenly, and with ease and pleasure, an idea whereof cannot be formed by the help of a description without time and pains, and a greater attention than most readers have patience to give it. And for directions to the best figures of known and described plants in other books, to have recourse to them would distract and interrupt the reader; and it is likely but few readers would have the books referred to, so that though by printing this work without figures it would be rendered of more general use, being less bulky and of lower price; yet inferring some kind of necessity of purchasing the books referred to, it would occasion as great an expense as if it had been printed with cuts. But as for the danger of losing the whole, that is inconsiderable, it being, perchance, as good lost as found. For my own part, my motives to attempt the compiling it were the instigation of some friends, and a consideration that no Englishman since Dr. Turner hath written so of plants, but that a man of no more skill in botanics than myself may easily enlarge and amend what they have done. Besides, had they done never so well, their works are in great measure useless to foreigners, as being written in English. Dr. Morison is a Scotchman, so I make not him an English herbarist, nor pass any sentence on his performances; *judicio stetque cadatque tuo.* But this paper will hold no more; scarce room left to assure you that I am, &c.

Black Notley, October 22, —84.

Dr. Hans Sloane to Mr. Ray.

Sir,—I am heartily glad to hear that you are about so useful a work as the history of plants, done by you, will be; I am sure we want it extremely, and that it will be very much esteemed by the botanists beyond sea, particularly Monsieur Tournefort, the king's professor at Paris,

with whom I correspond, who told me he desired it extremely, and that he had a very great respect and honour for you, desiring me to give you his most humble service; and if you will be pleased but to let me know anything you may have occasion for that can be procured at Paris or Montpellier, I will do all in my power to help you to it. I have several plants that I brought from both places; amongst which are several nondescripts; all which shall be at your service, with what remarks I made about them, either as to their growth or virtues.

The following plants are thought rare at Chelsea and Fulham:*

Arbor Indica Benzoinum fundens. N. D. It smells very strong, just like balm.
Cedrus Novæ Angliæ. N. D.
Cedrus Bermudæ. N. D.
Cedrus fol. laricis Conifer. B. pin.
Acer florescens, Tradescanti.
Sassafras.
Polypodium Mexicanum. Reccii.
Arbor Amara Reccii.
Lonchitis aspera major Math.
Amygdalus Afr. Fl. pleno fruct.
Holoser. Breyn.
Polypodium Plumosum. N. D.
Pseudo-dictamnum Tingitanum acetabulis Moluccæ spinosæ Mor.
Pinus Hierosolymitana. N. D.
Convolvulus peregrinus fol. hederaceo anguloso. B. pin.
Cedrus ex God. N. D.
Evonymo affinis Afr. Herm.
Oxycantha Virgin. N. D.
Styrax fol. aceris Virg. N. D.
Galegæ affinis Hexaphyllos Zeilanica. N. D.
Senecio arboresc. N. D.
Genista Platyphyllos Zeilanica Fl. purpureo siliq. bullat. N. D.
Geranium arboresc. N. D.
Hemionites multifid. Park.
Anonymus fol. et fruct. Ribes.
Amomum Novæ Angliæ. N. D.
Arbutus Virgin. N. D.
Nerium Odoratiss. Herm.

I believe you may have seen most of these, they being survivors of the last winter, and probably the most of

* I can determine but few of them, and so omit them altogether. C. C. B.

them will keep out this. Mr. Watts having a new contrivance (at least in this country), viz. he makes under the floor of his greenhouse a great fire-place with grate, ash-hole, &c., and conveys the warmth through the whole house by tunnels, so that he hopes, by the help of weather-glasses within, to bring or keep the air at what degree of warmth he pleases, letting in upon occasion the outward air by the windows. He thinks to make, by this means, an artificial spring, summer, winter, &c.

London, November 11, 1684.

Dr. HANS SLOANE to Mr. RAY.

SIR,—The *Fungus Campaniformis niger multa Sem. plan. in se continens* of Merrett's *Pinax* [*Nidularia campanulata*, With.], grows plentifully here in several places in London, and seems to me very pretty in the contrivance of the seed; for within the cup of the fungus, which is like a bell, or rather the top of *Muscus Pysoides*, or *Pixidatus Ger.* [*Scyphophorus*], there lies several seeds fastened to the bottom of the cup by means of a very small thread, or fibril, which I suppose might bring the sap from the root to the seed: it has but a small root, and usually comes out in a round white tumour from old wood, which serves to keep up the sides of borders; the rain falling into this cup, and filling it, the seeds are heaved up and washed over, and sow themselves. Perhaps this *Fungus* may have a near affinity with the common *Muscus Pixidatus*, and this may have some seed too. This *Fungus* is figured by Menzelius in his description of some plants in several places of Germany. Its name, or what he says of it, I do not now remember, not having the book by me. If you have not taken notice of this *Muscus* or *Fungus*, I will observe it more narrowly and send you its history. Yesterday I was at Chelsea Garden to see how the plants were preserved there this cold weather,

and found that in the daytime they put no fire into their furnaces, and that in the night they not only put in some fire, but cover the windows where they stand with pitched canvas, taking this off and opening them as much as the air or wind permits. There is now in flower the *Sedum arboresc.* [*Sempervivum arboreum,* Linn.] This is the fourth year of its age; it is in a pot, and has continued flowering for this four months, and is very pleasant. Mr. Watts expects to have Aloe this year in flower, it being already set for it. He has several myrtles not described, a fine amaranthus, of a crimson colour, which comes from the East Indies, and some fine Cyclamini. When I shall have the happiness to peruse what you have, or are a writing on any of the tribes, if I shall have observed anything concerning them not mentioned therein, I shall not fail to give you an account.

There is a vast number of East and West India seeds come over this year; among the rest, great store of *Pisum arborescens,* all the sorts of the *Abrus, Tea,* &c. Of all which there are great expectations, and as they come to perfection you may expect from me an account of them.
* * * *

London, Dec. 20, 1684.

Dr. HANS SLOANE to Mr. RAY.

SIR,—I should be of the mind, that to supersede the use of botanic authors, and make your history everyway complete, it would be necessary to mention all the varieties of the Harts-tongues, for instance, to be found in any catalogue or garden; and so of all other herbs; for it will much please the humours of men, and the possessors or admirers of such varieties may take it ill to have what they esteem so much left out. Therefore, if at the end of each species there were named all the variations, I think it would not be amiss, especially considering it would

tend to the giving of a fuller history of the plant itself, and that it may hinder mistakes.

I have two sorts of the *Bangue*, which were sent from two several places of the East Indies: they both differ much from our Hemp, although they seem to differ most as to their magnitude; I do not in the least doubt but these sorts of *Bangue* are those with which the Indians use to provoke venery; the leaves, and all the plant, not being carefully dried, makes a good description from them impossible.

I have been told by several, that *Muscelin* (so much in use here for cravats) and *Calligo*, and the most of the Indian linens, are made of nettles, and I see not the least improbability but that they may be made of the fibres of them.

London, Jan. 31, 168¾.

Mr. Ray to Dr. Hans Sloane.

Sir,—Your advice concerning inserting the varieties of sundry species, especially such as are esteemed for their beauty or variety, I approve and shall observe. Howbeit it is not my intention to supersede the use of any approved botanic author; but my reasons for attempting this work were,—1. To satisfy the importunity of some friends, who solicited me to undertake it. 2. To give some light to young students in the reading and comparing other herbarists, by correcting mistakes, and illustrating what is obscure, and extricating what is perplexed and entangled, and in cutting off what is superfluous, or under different titles repeated for distinct. 3. To alleviate the charge of such as are not able to purchase many books: to which end, I endeavour an enumeration of all the species already described and published. 4. To facilitate the learning of plants, if need be, without a guide or demonstrator, by so methodizing of them and giving such

certain and obvious characteristic notes of the genera, that it shall not be difficult for any man who shall but attend to them and the description, to find out infallibly any plant that shall be offered to him, especially being assisted by the figure of it. And, lastly, because no man of our nation hath lately attempted such a work; and those that formerly did, excepting Dr. Turner, were not sufficiently qualified for such an undertaking, and so have acquitted themselves accordingly.

I wish I had assurance from eye-witnesses of credit, that those sorts of linen you mention are made of nettle-stalks. I have heard and read the like of Scotch cloth, but dare not give credence to it, because I find not that Dr. Sibbalds, in his 'Prodromus,' makes any mention of it, and am loth to put in anything on uncertain rumour.

Black Notley, Feb. 11, —84.

Dr. HANS SLOANE to Mr. RAY's last Letter.

SIR,—For the *Polypodium plumosum*, I can tell you but very little of it, except that it had its name from its leaves being like feathers. Its place of growth, and other things relating to its history, can scarce be told by any in England; for I think it is sent us from Holland, and probably may come to them from the East Indies, though I cannot say that positively. It is a perennial plant, and has endured this last winter without being either in pot or greenhouse.

I was the other day at Chelsea, and find that the artifices used by Mr. Watts have been very effectual for the preservation of his plants, insomuch, that this severe enough winter has scarce killed any of his fine plants. One thing I much wonder to see that the *Cedrus Montis Libani* [*Pinus Cedrus*, Linn.], the inhabitant of a very different climate, should thrive here so well, as, without

pot or greenhouse, to be able to propagate itself by layers this spring. Seeds sown last autumn have as yet thriven very well, and are like to hold out. The main artifice I used to them, has been to keep them from the winds, which seem to give a great additional force to the cold to destroy the tender plants.

I have one very perfect leaf of the Japan Camphire tree, and have likewise some of the root of the Cinnamon tree, with a specimen of the oil and camphire that is distilled from it. One thing I would acquaint you with about cinnamon is, that a gentleman of my acquaintance having a great mind to have some of the true oil of cinnamon, he took 12lbs. of it and distilled it in a proper vessel, but had no oil at all. He from thence concluded, that all the cinnamon is divested of some of its most fine particles before any of it comes to us; and, speaking to Mr. Hermans on that subject, I remember he could scarce deny it, although his being a servant to the Dutch East India Company would hinder his telling of that secret, by which they receive so much money.

London, March 7, 168¼.

Dr. ROBINSON to Mr. RAY.

SIR,—I have inclosed some sugar of the first boiling, got out of the juice of the wounded maple; Mr. Ashton, our secretary, gave it to me for you; it was sent him from Canada, where the savages prepare it out of the aforementioned liquor, eight pints whereof affords a pound of sugar. If you have any of these trees near you, or the birch, or any other weeping trees, I wish you would make a trial, proceeding as in the juice of the sugar-cane. The Indians of Canada have practised this time out of mind; the French begin now to refine it, and to make great advantages.

London, March 10, —84.

Mr. Ray to Dr. Robinson.

Sir,—Yours of the 10th instant I received last post, and therein an inclosed specimen of the Canada sugar, &c., a thing to me strange and unheard of before. It were, as you suggest, well worth the experimenting whether the like might be gotten by boiling up the juices of any of our weeping trees, though I confess I doubt much of the success. For, first, there are so few trees common to the New and Old World, that it is likely this may be a sort of maple* specifically distinct from any of ours. But, secondly, suppose it be not, it may yield a saccharine juice in America, and yet not in England; as we see the ash-tree yields manna in Calabria, and yet not anywhere else in Italy itself. Thirdly, if it be the lesser or common maple, that is such a nice tree that few of the kind, and those only at some critical seasons, will bleed with us; so that it is a hard matter to get any quantity of their juice. For mine own part, there are not any of the greater maple, or sycamore trees, that I know of, growing nearer than half a mile off us, so that I cannot attend the gathering their juice, without the expense of more time than I can or am willing at present to spare. The like I may say of birches. We have, indeed, of walnuts some growing near us, but I suspect their scrupulous owners would scarce be willing I should pierce them; so that I doubt whether I shall be able to make any trials of this kind; and I make no question but some members of the Royal Society may have more leisure and better opportunities of making them than myself. My thoughts are almost wholly employed at present in the carrying on the History of Plants; and I am like him who said, "Pectora nostra duas non admittentia curas."

As for the History of Fishes, I doubt not but you may add to it many things by me omitted; those authors

* It is the *Acer saccharinum*, Linn.

you mention having not been seen by me. Dr. Tyson's 'Anatomy of the Phocæna,' I dare say is very exact; but, when I begun, that history was not published, at least I had no knowledge of it, and since have neglected to send for it. I am sensible that the history of the cetaceous kind is far from perfect, but in my circumstances it was not easy for me to carry it on any farther. There wants a description of the Unicorn-fish [the Narwhal—*Monodon monoceros*], of which there are figures of two kinds in the History of the Antilles, written in French; but I do not much confide in that author. There is a prolix description of the skeleton of the head in Wormius's Museum, but too tedious for me to transcribe. I am to seek for descriptions of many species of whales, mentioned in catalogues of them; but I take many of them to be fictitious, and have little hopes of getting any good information of them. Both myself and the public (if this work ever be printed) shall be beholden to you for your contributions to it. If the publishing of it be deferred till Mr. Willughby's son comes of age, I doubt not but he will be at the charge of necessary plates rather than it should be suppressed. My Lord Bishop of Oxford is highly to be commended for his forwardness to promote any good design. For this History of Fishes, I can warrant it to be as full and perfect as to the number and species, and their descriptions (excepting only the cetaceous kind), as was the history of birds. The *Exanguia dquatica* I account rather insects than fishes; and, besides, neither Mr. Willughby nor myself had so fully described each several species, nor ranged them in their classes as was necessary for a complete history of them. But as to designs for the cuts, I have several drawn by hand from the life, and have already, for every species, made a reference to the place where the best figure of it is extant in Gesner, Aldrovand, Rondeletius, Salvianus, &c., (I mean in my judgment) in a paper I have by me, which you may command.

Black Notley, March 13, —84.

Mr. Ray to Dr. Robinson.

Sir,—A friend and neighbour, apothecary, whom I employed yesterday, brought me the effect of his boiling the juice of the greater maple. Having boiled as high as an extract, he found a whitish body somewhat like brown sugar, and tasting sweet, but withal of a woody relish, immersed in a body of the colour and consistency and taste, too, of molasses. Upon curing, I do not doubt we shall have, after the molasses are separated, a perfect sugar, but in very small quantity, not above an ounce from a gallon of liquor. Possibly, nay likely, afterwards, when the liquor begins to run thick near its ceasing, it will yield a greater proportion of sugar. When he hath cured it, I will give you a farther account of it.

Black Notley, April 1, —85.

Mr. Ray to Dr. Robinson.

Sir,—Dr. Lister's opinion (from whom I had all I know of the Rudde) and yours, who have thoroughly examined and compared figures and descriptions, concurring, do fully satisfy and convince me that the Rudde [*Leuciscus erythrophthalmus*] is the Rotcle of Baltner, and not the Orphus or Nerfling. I also perceive, that the fish described by us for the Orphus, is no other than the Rudde or Rotcle, which I suppose was somewhere in Germany brought us by the name of Nerfling, and under that name described, which occasioned all this mistake and confusion. If I had Mr. Willughby's notes, I doubt not but I could find out a more exact description of the Orphus than will be met with in authors; for that fish, I am sure, was more than once described by us. But it is almost impossible to procure a sight of them, and therefore we must be content with such a description of the

Orphus as we find in Gesner. I did describe most of the animals we met with in our travels; but all my notes of high and low Germany were unfortunately lost.

Your chapter *de Chymicâ Plantarum Analysi* I have read over with much pleasure and satisfaction; in the title before *Usu*, I think it will be necessary to add *Resolutarum*, or *Partium Resolutarum*. It is all very good, only in a particular or two, wherein you are positive I am somewhat doubtful, as whether all the parts into which a plant is separable by fire, be transmutable one into another. For though I am of your opinion, that their immediate component particles are not primary and indivisible elements, yet do they contain so many such of one kind, that I doubt whether the whole body of one (for example fixed salt) be transmutable into the whole body of the other (for example water); for if it may, then these being the most simple bodies we know, one would think that *quodlibet* may be made *ex quolibet*, and that there are no fixed and indissoluble principles in nature, which I think is otherwise demonstrable.

I grant that the component particles may be separated from each other, and some of them mutually transmuted as inflammable spirits and oils, they, after the separation made by fire remaining still mixed; but from argumentation we must appeal to experience. Another thing I suspect is, that fixed salts of plants, were they perfectly freed from all adherent heterogeneous particles, would not be found to differ from each other in any sensible quality or accident; but neither do you affirm so much of fixed salts so freed, but of them such as we have them, wherein I do fully agree with you.

Black Notley, April 29, —85.

Dr. Robinson to Mr. Ray.

Sir,—As for the transmutation of secondary principles, or elements, one into another, I was tempted to believe it practicable, upon discoursing several times with Mr. Boyle upon that subject, and upon reading his new Appendixes to the 'Sceptical Chemist,' and to the 'Aery and Icy Noctiluca,' where he affirms that oils and water may be wholly changed into earth, though never so well purified before; and that salt and sulphur are transmutable into insipid water, which also Tachenius demonstrates, and salt into earth; and this not by the addition of any new parts, but by mere transposition, division, or some new modification of the constituent parts, which, making a different impression upon our senses, may produce new qualities or accidents; but you, being a much greater master of the Epicurean philosophy than myself, are the best judge of this. I always fancied that there were no fixed or immutable principles (I mean elements) in nature, as she stands at present, but what may be subject to changes upon new motions, or modifications, unless we suppose pure atoms without concretions, and them too under the same constant laws of motion. I grant that salt, water, or any other purified element, may contain many corpuscles of the same kind; yet these same particles, by various transpositions, divisions, motions, or any other new modifications, may put on different faces and shapes, and raise in us various perceptions of different qualities and accidents. If this philosophy be true, then fixed salts themselves may differ from each other in sensible qualities, or accidents, according to the operations or other circumstances, though they be carefully purified. Mr. Lewenhoeck hath observed great variety of figures in them after they had been diligently freed from adhering heterogeneous particles; and the very same numerical lixivial salt will put on different shapes and figures, so that it will appear a

marine or muriatic salt, an essential salt or nitre of plants, and also a fixed alkali salt. I have seen great varieties of fermentations produced, by pouring the same acid spirit upon many several fixed salts prepared and purified all alike. Their sapors do very sensibly differ in solutions; and you cannot make *aurum fulminans* with so small a quantity of any fixed salt as that of tartar. I do conclude, therefore, against you and Mr. Daniel Cox, that fixed salts do really differ in qualities and accidents. However, I submit to your excellent judgment, and I will not be positive in this or the other controversy.

London, May 9, —85.

Mr. Ray to Dr. Robinson.

Sir,—Yours of May 9 came to hand last post, wherein you produce good authority for what you affirm concerning the mutual transmutation of vegetable principles, or immediate component particles, whereto I can say nothing, unless I had the author's books you cite; and perhaps not then neither, unless I should repeat the experiments myself.

But that there are fixed and physically indivisible principles in nature I thus argue:

If there be no such, but bodies are infinitely divisible, how can there be any constancy in generations or productions?

Why are there not infinite new concrete and mixed bodies daily produced, and as many lost?

For if bodies be infinitely divisible, figures being infinite, the particles whereunto they are divided must probably be of infinite figures, and few alike; and why should those of the same figure convene?

How come bodies to be divisible, even by fire, into great numbers of parts, either really homogeneous, or seemingly so, and not rather into infinite varieties of par-

ticles; as when a man, with the forcible stroke of a hammer, breaks, for example, a brick, it flies into innumerable parts, of different figures, perhaps scarce any two like?

How come there to be such great aggregates of bodies of the same kind, as water, earth, air?

Whereas you say the same particles, by various transpositions, divisions, motions, &c. may put on different faces, and stir up in us various perceptions, I answer, that I cannot imagine any other difference of bodies but what proceeds from the motions of figures of their component particles.

From the motions of them can come nothing but a greater or less measure of fluidity; therefore all other varieties must arise from their figures. From the figures of homogeneous particles, or such as are of the same shape, no considerable varieties can proceed; for, from suppose a bag of shot, perfectly spherical and solid, should I shake or move them to the world's end, I should get a body of no other texture than I had at first; though in bodies of other figured particles there might possibly be variety of textures, from the situs of the component particles in respect of each other. Yet this is not likely, because it is very difficult to set the particles, all or most of them, in one and the same situs one to another, and scarce possible to be done but by an intelligent agent, which yet must be done to produce like and homogeneous textures; therefore the most of these differences must arise from the admixture of heterogeneous particles. The fire is not such an analyst but that it doth communicate particles to the bodies it divides or transforms, as we see in minium made of lead, in which, that some parts out of the fire adhering to the lead do so transform it, appears probable by the increase of weight; and many other like instances there are.

That fixed salts are all alike (whether they be compound or simple bodies), I gather from the impressions they make on our senses, and from their operations.

Probable it is, that the heterogeneous particles may, in greater quantities, and more closely adhere to them in some vegetables than in others.

In fine, that there are innumerable concrete bodies of the same figure is evident to sense in the crystals of salts. That these particular crystals must be composed of like-figured particles (one to another, though not to the concrete), and those again of the like, *usque ad minima*, is highly probable, if not demonstrable, in reason; whereas, were bodies infinitely divisible, and consequently of no certain figure (the minima I mean), I do not see how we could ever come to such regular concretions, at least to such multitudes and masses of them, but that the world must have continued, as the poets first fancied it, a chaos. But enough of this.

Black Notley, May 12, —85.

Dr. ROBINSON to Mr. RAY.

SIR,—I received yours of the 12th instant, and am sufficiently convinced that there are fixed and certain principles in nature, and settled laws of motion; yet I have some reason to believe that they are not immutable, but that some outward violence and preternatural causes may alter them, though they are seldom or never mutable in the ordinary course of things. If you please, the transmutation of the parts of analysed bodies shall be struck out of the chapter *de Chym. Plant. Analysi partiumque resolutarum Usu.*

London, May 19, —85.

Mr. Ray to Dr. Robinson.

Sir,—Last post brought me yours of May 19. In answer whereto, seeing what you assert concerning the transmutation mentioned may be true, and is supported by good authority, and your opinion, I see no reason it should be struck out; for those principles into which bodies are immediately resoluble by fire, being not primary but compound bodies, it may consist with my opinion of certain and fixed first principles well enough.

Reading in the 'Philosophical Transactions' of March last your observations on subterraneous streams, I find you mistaken in one of your conjectures concerning matter of fact, that is concerning that they call the burning fountain [*La Fontaine que brûle*] near Grenoble, in Dauphiné, which our curiosity led us to make an excursive journey from Grenoble on purpose to see. This place is about three leagues distant from the city up the river. When we came there, we were much deceived in our expectation; for, instead of a burning fountain, which we dreamt of, from the name and relations of others, we found nothing of water, but only an actual flame of fire issuing out of a vent, or hole, in the side of a bank, plainly visible to the eye, to which if you applied dry straw, or any other combustible matter, it took fire presently. I took it to be nothing else but a little *spiraculum* of a mine of coals, or some such like substance, fired; and my reason was, because the bank, out of which the flame issued, looked much like slate and cinder of coals. One thing I cannot but admire, that is the long continuance of this burning. I find mention of it in 'Augustine de Civitate Dei,' lib. i, cap. 7. "De fonte illo ubi faces extinguunter ardentes et accenduntur extinctæ non inveni in Epiro qui vidisse se dicerent, sed qui in Galliâ similem nôssent, non longè à Gratianopoli civitate;" by which relation of the good father, we see how he was abused

and imposed upon by relators that were eye-witnesses. I myself also was abused in like manner, and therefore do verily believe there was then no more fountain there than is now—that is a fountain of fire, which, from the constancy and perpetuity of its issuing out, it may be called. Hence we may learn what credit is to be given to the verbal relations of the generality of travellers.

Black Notley, May 22, —85.

Dr. Robinson to Mr. Ray.

Sir,—I thank you for freeing me of my error concerning the burning fountain near Grenoble. Some French and other writers were the authors of my mistake. Monsieur Boissieu (a native of Dauphiné, and a learned person), speaking of the burning fountain of that country, says, "Aqua è rupe procurrit, et ipsa frigida, sed sulphure et bitumine levitèr imbuta, cujus superficiei si sulphuratum admoveris extinctum statim accenditur, ardetque luculentèr; ardet et admota palea, imprimis cœlo nubibus cooperto." To save his credit, we may suspect well enough that he either speaks of a different place from that you were at up the river, or else that some times of the year springs may arise near the bank, where the combustible steams may meet with, and run through them, and so produce the aforesaid phenomena; but this is only a mere conjecture of mine.

London, June 2, —85.

Mr. Ray's Answer to Dr. Robinson.

Sir,— Yours of the 2d instant I received last post. In answer whereto, I approve one of your excuses and salvos for the credit of the authors that have written concerning the burning fountain, viz. that probably enough in winter time there may issue water out of the same vent whence the fire proceeds; for the time we saw it was in the height and heat of summer, viz. about the latter end of July; but that the water hath no interest in the kindling anything applied thereto I am confident, for we saw an actual flame streaming thence, which must needs kindle straw, or any other combustible matter it meets with. And here, by the way, I cannot but reflect upon a passage I meet with in Doctor Plot's letter concerning sepulchral lamps, in the 'Philosoph. Transact.' of December last. It is this: "Such as the flame over the well and earth about it in one Mr. Hawkley's ground in Lancashire, that (like the fire of Plato) only shines, and does not burn." Herein is contained a double mistake; for, as I was informed by persons of the greatest credit and undoubted fidelity, where the inflammable steam or vapour ascended, was no well at all, but only water in a ditch, which dried up in summer time, and which the experimenter who told me (no other, indeed, but Dr. Wilkins, Bishop of Chester) caused to be laded all out; and that when the ditch was quite empty the inflammable steam ascended in like manner as before. Next, the words seem to import that there is a constant flame over the well and ground about; whereas there is no such thing, but only a steam constantly ascending, which catches fire by the application of a lighted candle, or any other flame. Besides, I never before heard, and can hardly be induced to believe, that that flame only shines and does not burn, none of my relators mentioning any such thing, which had been the strangest miracle of all.

Your former conjecture, that there may be a different place, I cannot allow, because those who write of it say it is near Grenoble, as this was; and we, inquiring upon the place, heard of no other but this; and that this is that which is usually visited by travellers one may know by the hackney-men, who are very well acquainted with it; and Golnitz, in his 'Itinerary of France,' notes this for the "Fontaine que brûle." But enough of this. Another thing I meet with in the same 'Transactions' of January last, in Mr. Waller's observations concerning the *Cicindela volans*, of which I am in doubt, though I confess I am more inclinable to believe what Mr. Waller asserts, that both male and female have wings, it being more agreeable to the analogy of other insects, besides the credit of the person who saw them in copulation. But then what shall we say to Carolus Ventimiglia, to whom I am loth to give the lie. Indeed, if his credit were as good as the relator's, F. Columna, I dared not. "Cûm enim (saith he) ex nudis plurimas haberet in vitro inclusas, animi causâ alatam captam iis adjecit, quæ continuò se spectante unam ex nudis subegit, eique adhæsit ut bombyx solet, ab eâ deinde divulsa aliam atque aliam, quæ sequenti die parere cœperunt," &c. Besides, how came this to be the received opinion before?

Black Notley, June 5, —85.

Dr. Robinson to Mr. Ray.

Sir,—Take a Pilchard [*Clupea pilchardus*] by the tip of the back-fin, and it hangs in equilibrio, but a Herring [*Clupea harengus*] so held sinks headlong. This was tried lately.

M. Dodard affirms that he hath frequently found between the bark and the wood of old hornbeam trees a very odd vegetable substance, having black membranaceous

stalks, dividing themselves into many branches, at the ends of which there generally grew little balls, or buttons, as large as peas. He fancies this to be a vegetable as much distinct from the hornbeam as mistletoes are from the trees they grow on. M. Dodard could only find it in old wormeaten hornbeams, never in young or sound ones, which makes him conclude that it cannot anyways serve the economy of the tree, but that it is a plant growing up in decayed hornbeams, exactly between the bark and the wood. It is as it were set (*enchassée*) in the bark, into which it here and there enters, and loses itself. M. Marchand found a hornbeam tree, whose trunk being cut off, yielded on all sides a gum very like to gum lacca. This gum of the hornbeam M. Clos dissolved in spirit of wine. The trunk continued to pour forth many gummy threads for some years after it had lain in a low room. M. Dodard afterwards observed the same gum upon many hornbeam trees. I have extracted this from the 'Journal des Sçavans,' an. 1675. Mens. Decemb.

Wepfer, in his history of the *Cicuta aquatica*, proves that most of the poisonous plants, as all the hemlocks, the hellebores, the solanums, the napellus, hyoscyamus, &c. are hot and acrimonious, and kill by saline, fiery, and pointed particles, which vellicate the *genus nervosum*, and either congeal, or else colliquate, the blood. The best way to cure these poisons is first to give a gentle vomit, then oils, broths, warm water, and fat emulsions, till all be evacuated and come away; at which time alexipharmics, volatile salts, and other alkalies and anodynes are to be given.

I find upon the journals of my late voyage, that I observed many people in the Low Countries to make use of the turmeric root [*Curcuma*] in pickling and preparing their fish. They told me that it gave the fish a grateful taste and a yellow colour, which was much esteemed by them. I think Bontius remarks the same thing of the Germans and Poles.

I travelled from Capua to Naples in the company of an ingenious Neapolitan physician, who entertained me with the history of his country. He assured me that the *Fraxinus*, or *Ornus*, in many places north-west of Naples, afforded manna, of which the inhabitants made advantage, though it was not so much esteemed as that of Calabria; for, gathering and evaporating in the sun this saccharine juice, they always make use of wooden instruments and vessels, for it will prey upon metalline, or bony ones, and so lose its white colour when concreted. The afore-mentioned Neapolitan informed me that the Cicada did feed much upon the *Ornus;* which makes me conjecture that this insect (which you have well distinguished from our grasshopper) does pierce the tree, and so opens the passage for the manna to sweat out. I remember, in one of the German Ephem. I lately sent you, there is an account and figure of an Indian tree, upon which some insects are said to work, and prepare a sort of manna. I am apt to believe it may be a mistake, and that the manna works itself out of the tree opened and sucked by the insects; but you are best able to judge of these matters.

September 8, —85.

Mr. Ray to Dr. Robinson.

Sir,—M. Dodard's vegetable substance growing on the hornbeam tree I know not what to say to. I wish it were my luck to see it. That the same tree yielded a gum like lacca seems to me very strange, that being a bleeding-tree, of which I never heard of any that yielded any gum. Howbeit, M. Marchand was a very credible person.

Wepfer's poilosophy concerning poisonous plants may be possibly true, but it deserves farther consideration. *Pauca respicientes falsa pronunciant.*

I better approve your conjecture concerning the exuda-

tion of the manna; for I do not observe any kind of gum, or resin, or concrete juice, to issue out of any tree or herb but at some incision, or wound, or rift, or contusion, and therefore it is likely enough that the manna may issue out of the vessels containing the specific juice of the tree perforated by some insect. Your other conjecture also concerning the insect preparing a kind of manna is not improbable.

Black Notley, Sept. 14, —85.

Dr. Hans Sloane to Mr. Ray.

Sir,—I wrote a pretty while ago to you about the Hockesdon earth, which, because I fear it miscarried, I now repeat, desiring your opinion of it.

Not far from Moorfields, near the new square in Hockesdon, some workmen digging a cellar for a new house in the end of a garden, when they were about three feet below the surface of the ground, found a very strong smell in the one half thereof. Passing that way, and finding it very surprising, and a thing that I had neither heard of nor seen before, I thought it worth farther inquiry.

The workmen having dug a pit about six feet deep, at about three yards' distance from that end of the cellar which smelt so strong, I there found three several layers of earth one over another, all of them, more or less, having the same scent. The uppermost stratum was clay, or, as the workmen call it, loom. It did not smell till three feet deep, but then was very strong, and something noisome. If one look earnestly on some pieces of this clay, there are easily discernible several small quantities of a bituminous substance, brownish colour, and tough consistence. I doubt not but this substance gives

the smell and other qualities to this layer. This clay preserves its scent a pretty while, though by degrees it grows fainter; and being exposed to the air for about a month, will lose it quite. Eight pounds of this clay distilled in a retort, placed in a sand-fire (third degree of heat), yielded one pound of phlegmatic liquor, and six drachms of oil, of a quite different smell from anything I have hitherto met with.

The second layer was gravel, which reached from three and a half to about four and a half deep, or thereabouts. It very much resembles the other in all its qualities, except the noisomeness of its smell. It loses its scent much sooner than the former.

The third layer was an earthy sand, which smells stronger than the other two, and withal is much more fragrant. The deeper you dig it smells the stronger. I took eight pounds of this layer, at nine feet deep, and filled a retort with it, and placed it as the clay; but it afforded only six ounces of phlegmatic liquor, and two drachms of oil. This sandy loose earth quits its scent in about a fortnight, being exposed to the summer air.

Considering that waters owe their greatest differences to the several soils through which they pass, I was very desirous to see what sort of waters would be produced by their being percolated through such a strainer as this strange sort of earth; and desiring the owner to dig till he should find water, he accordingly did; and when he came to about eighteen feet deep, water came in very plentifully, conditioned as follows:—

It had at top a curiously coloured film, the colours of it resembling those of the rainbow. Under this was a whitish-coloured water, which, upon standing in a phial some days, lets fall a brownish sediment, and by that means becomes diaphanous. It smelt very strong, as the earth did; was somewhat bitter and clammy, as one may see by putting his hands in it, and suffering them to dry without wiping. If you put some powdered galls into a glass of this water, so soon, or a little after, you take it

out of the well, it will turn of a purplish red; but if it stand a day or two, it will not at all.

Several persons having drunk of this well, about three pints, say that usually it works about three times by stool, and very much by urine.

From which I conclude it to be a natural bitumen, perhaps *sui generis*, that impregnates both water and earth. I desire your opinion in it, and remain, &c.

London, November 10, 1685.

Mr. Ray to Dr. Hans Sloane.

Sir,—I received both your letters, and ought before now to have acknowledged the receipt of the former, but I must make my late illness and indisposition my excuse for so long delay. I now return you many thanks for the pains you have taken in assisting me in the carrying on the history that is now before me, and the many informations and advices you have given me, and other contributions you have made thereto, which shall be owned and gratefully acknowledged by me. My garden being a cold soil, and an ill-situated place, would not bring to maturity the gourd, so that I am like to lose that, as also the *Alcea Indica Ulmisea carpini folio*, and several others. The *Lunaria radiata Robini* [*L. radiata*, Linn.] came up and flowered, and formed its cod with me, but brought it not to maturity. I have a sort of *Lychnis*, raised, I suppose, from the seed you sent, which I cannot find described. It hath a very small white flower, though the plant be of a middle size, the least of any *Lychnis* I ever saw. The *Medica* [*Medicago*, Linn.] still continues to flower, and the trailing branches, as they lie on the ground, put forth roots from the joints. The book you did me the favour to send hath been of use to me, though I find it to be for the most part nothing but a collection out of Dr. Morison. I agree with you that

those who cultivate plants, and have the liberty and freedom to pluck up and observe their roots, have a great advantage of those who see them only in one state, and can take notice only of their superficial part, for that they may, as Dioscorides advises, mark their several states of first springing and growth, of consistency and declension, and note their differences, and so give us a perfect history of their whole progress and several mutations. But I should rather have been content with an imperfect and defective history, so it had contained notes sufficient to distinguish them from all others (because then I could have inserted them in their proper places in the body of the history), than to have waited for a more perfect and accurate to be put as an appendix.

I thank you for the account of the Hockesden earth, and the rather because I was lately informed that it was no natural bitumen mingled with it, but had its original from the burning of a painting-shop standing over the spot where the earth was digged up, and there was no such earth round about, but just within that compass; so that, as the Corinthian brass was made by an accidental mixture of metals melted down and running into one mass at the deflagration of that city, so this bituminous earth became impregnated by a mixture of oils and colours melted and mixed together, and soaking into the ground at the burning of that shop. Whether there be any truth in this you can best inform; but I suppose there is none, because you mention no such thing; and you have done very well thoroughly to examine the earth, for that probably there may be good use made of it.

I do herewithal send back your dried plants, and the book wherein they were, with thanks for the use of them. They have, I am sensible, received some prejudice which could not be avoided.

Black Notley, Nov. 17, —85.

Mr. Cole's Letter to Mr. Ray.

Worthy Sir,—I have for a long time engaged many masters of ships, and others, to bring home whatever they can find for me, as also on both the sides of Severn, and am of opinion, by what I have this winter found, that no river in Europe doth yield more variety, especially sea animals, great and small, and minerals, there being very high land on either side, high and rapid tides, often with violent storms, which have so much gained on the rocks and cliffs, that many fossils and figured stones are cast out and found on the shore, especially where at spring-tides the water ebbs far out. Such I have found this winter, i. e. figured stones, which would put you out of all doubt that there are many varieties of naturally-formed stones, which never were either animals or vegetables, or any parts of them, not only because no such shell-fishes were ever found, so far as appears by any known authors, or the collections that I have seen or heard of (and to suppose any species of creatures to cease cannot consist with the Divine providence, and is contrary to the opinion of all philosophers as well as learned divines); but it doth evidently appear by the figures of some of those I have found this winter, that they were never capable of being living creatures; as among others, to instance in one of those which can be reduced to none but the ophiomorphites, which I found growing between the thin plates of a kind of brittle blue slate in large rocks, some a furlong within full sea-mark, and some where the water comes not at the highest tides, only in great storms where the waves break, and sometimes dash when forced up by the wind. These being broken with a convenient tool, will shiver all into very thin plates, between which I found an abundance of those stones, as brittle as the slate in which they grow, and of the same consistence, yet so thin, that the broadest, being about four inches, are not so thick as a half-crown piece; some not half an

inch, and as thin as a groat, and so proportionably up to the largest, covered with a superficies as thin, and exactly of the colour of silver foil: and where the sea-water washeth them, and they are exposed to the sun and wind when the tide is gone, are tarnished, and appear of a gold purple, blue and red, as anything on which silver foil is laid, when exposed to the sun, wind, and weather, will do in a considerable time. These have the same spiral figures, and as regular as the other serpent stones, and, with a knife being taken off, leave the impressions on both sides of the slate. In such rocks of slate, but much harder, I found (and employed men with tools to dig them out) some of those stones of another kind, thick in proportion to their breadth, from an inch to twenty-eight inches broad; and the last broadest one was at the great end (on which some authors have fabulously reported the head to grow) six inches thick, all of them covered over with a white scale, which may be taken off, one coat under another, as pearls, or the shells of some fishes. I saw some impression of others near as big as the fore wheel of a chariot. I could not get one of those large ones whole, but brought it home in parts, and have promised a good reward to the labourers I employed if they dig out and send me a whole one, which will be a rare sight, the magnitude, colour, and figure considered. I found other stones something resembling a nautilus, but so much differing from those we know, that I am confident they were never shell-fishes.

Bradfield, March 27, 1685.

Mr. JOHNSON to Mr. RAY.

SIR,—I have inclosed a draught of our Branlin [the young of the salmon, *Salma salar*], which I took from the fish, which now I know comes too late; but I hope you found the other I sent you before, which was far more exact, being done by an excellent artist. On the back side you have the description of a new English bird [the Bohemian Waxwing, *Bombycilla garrula*]. It agrees in material points with your *Garrulus bohemicus;* and therefore I imagine it to be of that sort, for some birds vary much in colour. They came near us in great flocks, like Fieldfares [*Turdus pilaris*], and fed upon haws, as they do. I cannot but think that the wars in those parts have frightened them thence, and brought them hither this winter (which with us was above measure plentiful in haws), for certainly they are not natives. And now it is in my thoughts, I would intreat you, at your best leisure, to let me know if you can tell anything certain concerning the birds of passage, whither they go, when they leave us? If it be granted that the swallow kind, and such small birds, do hide themselves in rocks or trees, yet storks, soland-geese, and birds of great size, cannot possibly do so. The moon is too far a journey; and a new world in the south temperate zone methinks they can hardly reach, seeing Wild Geese [*Anser segetum*] from Ireland, and Woodcocks [*Scolopax rusticola*] from Norway, come often so tired to us; and yet how they should escape the eyes of so many diligent inquirers, both by sea and land, especially since our increase of trade and navigation, is to me a matter of no less difficulty.

Brignall, May 7, —86.

Mr. JOHNSON's Descriptions.

Salmoneta. A Branlin.

LONGITUDO semipedalis, capitis gracilitate, dorsi colore cærulescente, et caudâ furcatâ salmonem æmulatur; linea lateralis 6 vel 7 notulis rubris insignitur. Pars superior ad dorsum usque nævis etiam nigricantibus aspergitur. Per latus umbræ 7 (plus minùs) nigricantes descendunt, quibus facillimè à truttâ distinguitur. Oculi ampli, aurei, protuberantes. Pupilla cærula. Os parvum denticellis repletum. Pinnæ, quales in salmonum genere, in ventre rubescunt. Branchiarum operculum notâ nigrâ quandoque duabus maculatur.

Capta in Teesâ flu. Mart. 10, 168§.
è vivâ delineavit R. J.

An Garrulus Bohemicus, sive Ampelis.*

Merulà paulo minor, rostrum nigerrimum, passeris magnitudine, caput cristâ longiusculâ decoratum quæ versùs rostrum ex castaneo rubet, retro cinerescit. Sub mento macula nigra, ampla, supra oculos linea etiam nigra retrogreditur. Totum dorsum leucophæum, versùs uropygium tamen magìs cinerescit. Cauda quæ 12 pennis constat, imâ parte cinerea, mediâ, nigra; extima pulchrè lutea. Alæ nigricant, è rectricibus 1ma tota nigra, 2da, 3tia, et 4ta, exteriore margine in album desinit, 4 proximæ in luteum deinde 8 in album, adeò tamen ut ex his 5 interiores appendices habent cinnaberinos. Alarum tegeres exteriores in album terminantur. Reliquæ leucophææ.

Pectus leucophæum, caudam versùs albicat. Sub caudâ plumæ castaneæ quasi alteram caudam minorem efficiunt, caro et plumæ tactu mollissimæ, nec linguam, nec pedes, nec rostra, nec barbam picorum vel lyngis habebat. Gregatim volitant.

Capt. mense Martio 168§.

* The Waxwing, called also the Bohemian Chatterer.

I saw another, perhaps the female; like the former in all things, save that the breast and belly were all of one colour (leucophæous), not growing whiter toward the tail, and that the two utmost rectrines had no white at all, nor scarce any appearance of yellow in the rest, and but four tagged or pointed with crimson; and which I did wonder at, there were indeed but ten feathers in the tail. Whether this was the natural number, or that two had been shot away, I could not satisfy myself.

Dr. HANS SLOANE to Mr. RAY.

SIR,—In turning over my Paris Garden Catalogue, I found a catalogue of nondescript plants growing there in the year 1683. I saw and took notice of them there, most of the names being given by Dr. Tournefort, whom I expect to see here shortly. The catalogue I transmit you as follows:—

Abrotanum fœmina foliis crethmi. D. Fagon.
Abrotanum fœmina foliis rorismarini. D. Tournefort.
Betonica purpurea spicâ molliori, longiori, et seriùs florente. Tournefort.
Brunella alpina folio angusto integro. D. Tournefort.
Caucalis elegantissima pyrenaica. D. Fagon.
Cerinthe major alpina. Tournefort.
Chamæsyce foliis hirsutis. Tournefort.
Cicutaria latifolia fœtida. D. Fagon.
Cucumis Asininus folio Anguriæ. D. Fagon.
Daucus pyrenaicus odore citri. D. Fagon.
Echium Creticum latifolium rubrum. Tournefort.
Erysimum siliquis quasi implicitis. D. Fagon.
Ferula folio latissimo. D. Fagon.
Horminum pyrenaicum anguriæ folio viscosum. D. Fagon.
Laserpitium umbellâ contractâ et concavâ. D. Fagon.
Meum adulterinum longiori folio. D. Tournefort.
Nasturtium aquaticum maximum. D. Fagon.
Oenanthe capitulo longiori et hispidiori. D. Tournefort.
Ruta arborea latifolia. D. Tournefort.
Salviâ Cretica coccifera. Tournefort.
Scabiosa folio dipsaci. Tournefort.
Senecio Lamii folio. D. Fagon.
Seseli pyrenaicum Thapsiæ folio. D. Fagon.

Succisa angustifolia alpina. Tournefort.
Stachys pyrenaica. D. Fagon.
Stachys Cretica major. Tournefort.
Tithymalus ranunculi radice. D. Fagon.

In our simpling journey to Sheppey we found a perennial Kali [*Salicornia fruticosa*, Sm.*], differing something from that on the Mediterranean shore, in that it creeps, whereas the other is erect. Then the green tops are thicker than that on the Mediterranean shores; and Mr. Watts assures me it is a perennial. It grows near King's Ferry, in Sheppey, where also is cast upon the shore the *Fucus spongiosus nodosus Ger. emac.* In the same place, in the ditch, grows plentifully an *Atriplex maritima folio sinuato candicante angusto.* It seems to differ from the common *Sinuato candicante pin.* as the common *Maritima* from the *Sylvestris altera.* I send you down specimens of them, and *Axtius de pice conficiendâ*, and *Arboribus coniferis*, by the first carrier; as also that Fucus I formerly told you of, to look like a honeycomb, which I found cast upon the shore on Sheppey, as well as at Nesson. There is in town a bark come from Virginia, which has prickles, the bases of which resemble petrified Malta teeth. It stings the tongue in a very extraordinary manner; and he that brought it says it grows plentifully on the shore there. On Sheppey, searching for the copperas-stones, or *Pyrites*, I found that the most part of those taken up in that island are after north-easterly storms, that they are beat up by the waves, and taken up at low water. Among others I found one something extraordinary. It had been a *Buccinum* petrified, and after that turned into a *Pyrites;* so that you might see everything in it as in a *Pyrites*, viz. weight, colour, &c. I leave you to judge whether or no the difference between the *Atriplexes maritimæ* and *sylvestres* may not be occasioned by the differing soil; for, considering that both the *maritimæ* are less in their leaves than the *sylvestres*,

* Not of Linn. It is a form of the *S. radicans*, Sm.

it is somewhat probable that the brackish aliment of the one does not mollify nor distend the cells of the leaves so well as the other; but that is but a conjecture. I wish you all health and happiness; and am, &c.

London, August 10, 1686.

Dr. Robinson to Mr. Ray.

Sir,—The other day I and Mr. Doody (an apothecary here) had occasion to go five or six hours down the river, we found many rare plants upon the chalk hills and marshes near Gravesend; but they are all mentioned by, and very well known to you. We observed in the long broad vesicles at the end of the leaves of the *Fucus maritimus latifolius vulgatissimus*, many small dark round bodies adhering to the inner membranes, which contained a mucous liquor; whereas the round bladders in the other parts of the leaves were void of liquor, and of those dark solid globules, which gave Mr. Doody and myself reason to fancy that this plant abounds with seed, which, upon drying, disappears. And this seems to me to be no extravagant conjecture, for I begin to conclude that the seed of this plant (and others of the same class) may in time appear as manifest as the seed of the capillary herbs.

London, August 24, —86.

Mr. Johnson to Mr. Ray.

Sir,—I did indeed once imagine a possibility of knowing the medicinal virtues of plants by their signatures, which project, if it could have been brought to perfection, might have been of great use to physicians, who know nothing of them but by quack and second qualities, I

was hereunto encouraged by the unaccountable variety of colours, forms of seeds and seed vessels, especially number, which I found the *Conjugatæ* religiously to observe in some plants to the very division of the pointel. Besides the *Galeatæ* of sweet smell being mostwhat cardiac, the *Scandentes* often cathartic, those of a lurid flower poisonous, &c.; farther, I did consider that the Τεχνικα, or general terms of virtues, were not well ordered, but often did interfere one with another; and that if they were reduced to a method truly natural, plants might be accommodated to them more easily. These considerations did some time encourage me to observe the analogy of plants of the same kind, and their minute differences, not without great pleasure and delight; but when I found Dr. Grew had hit upon the same notion, and laid his inquiries much deeper than mine, viewing the internal as well as external parts of plants, and yet could conclude nothing, I quite desisted from farther search, despairing to meet with what others with more diligence had not found.

Brignall, October 29, —86.

Dr. Robinson to Mr. Ray.

Sir,—The Willows will sometimes drop and run prodigiously in dry and clear seasons at noon-day, as I have been told by several of good credit. In the year 1685 the willows wept so fast at noon-day in the month of March, near the neat-houses, that Dr. Plucknet passing on the road was extremely surprised, and almost wet to the skin; yet it had been no rain for many weeks before, and the air and other trees were very dry at the same time. I have heard this relation confirmed by other persons that observed the same. Trees may now and then be subject to bleedings, sweatings, catarrhs, and other extravasations; yet this is no very strong argument, I

confess, for the *Arbor aquam fundens*, because it is said to observe certain periods.

The Manchinelo is not only mentioned by Hughes and Lyon, but Rochefort. I think he hath misplaced it, for, as I remember, he hath put it amongst the animals. A planter tells me that they use the wood for beds and floors, because those insects, which eat and destroy all their other timber, will not touch this. Their beds and floors, and other wood-work, suffer extremely by an insect unless they are made of the manchinel wood.

The Cochineal* is a dried hexapode, that runs up and down a *Ficus indica*, and turns into a Lady-cow. I took it once for a Kermes, or Coccus of an Opuntia, or Tuna.

London, January 29, —8$\frac{6}{7}$.

Dr. Hans Sloane to Mr. Ray.

Sir,—I have talked a long while of going to Jamaica with the Duke of Albemarle as his physician, which, if I do, next to the serving his grace and family in my profession, my business is to see what I can meet withal that is extraordinary in nature in those places. I hope to be able to send you some observations from thence, God Almighty granting life and strength to do what I design; but our voyage having been put off so often, I doubt it very much. I am glad to hear by Dr. Robinson that your elaborate and excellent work goes on so fast as to begin already to print the trees. Great feuds are like to be between the French and our philosophers about the magnitude of London and Paris, ours alleging that London is as big as Paris and Rouen both together; and being urged by them to give some proof for what they say, I intend to print certificates from hearthmen here, and ingenious men there, that in London are 100,000 houses, and in Paris but 24,000. There is no less a dispute on

* The Cochineal is the *Coctus Cacti* (Linn.), it is found on the *Cactus cochenillifer* (Linn.) It is scarcely necessary to add, that it does not turn into a Lady-cow, or *Coccinella*.—C. C. B.

another account. The French ambassador to the king of Siam, carrying a Jesuit with him, he made several observations, and found that that kingdom was misplaced in longitude, to the east, about 22 degrees; but Mr. Hally says that he long ago found that out, and gave an account of it in the 'Transactions.' But I am mistaken if there were not something rectified about that a great while ago by some learned men. I suppose you have had an account of Dr. Magnol's new appendix; it is but small and less worth than I thought, for when I was there he designed to simple the Pyrenees and Hortus Dei, or mountains of Auvergne, where are many curiosities. We are now mighty solicitous about the Jesuit's-bark, or *Cortex peruvianus*, it being so good a drug, that they begin to adulterate it with black cherry and other barks dipped in a tincture of aloes, to make it bitter; but the bitterness of the adulterated bark appears upon its first touch with the tongue, whereas the other is a pretty while in the mouth before it be tasted. I am, &c.

London, Jan. 29, 1786.

Mr. Ray to Dr. Hans Sloane.

Sir,—I received yours of August 10th, and on Saturday last the specimens of plants by you discovered, with 'Antius de Pice conficienda' and 'Zaluzonius Methodus Herbaria,' which I have not as yet had time to turn over.

As to the plants, the *Fucus* is no other than that described and figured in J. Bauhine's history by the name of *Alga marina platyceros porosa* [*Flustra foliacea*, Linn., not a plant but a zoophyte], and is frequently found cast up on our shores; I take it to be that they call *silken wrack* in 'Phytologia Britannica.' I have entered it under J. Bauhin's name, and borrowed his description.

The *Kali geniculatum* [*Salicornia fruticosa* of Smith], I agree with you and Mr. Wattes to be different from that of the Mediterranean shores, and a new species, as

far as I can discern by the dried plant. The grass you sent I think is not the *Gramon aureum* of Dalechamp, for that is paniculate, and hath a pendulous panicle. We have discovered this grass hereabouts. The *Muscus* or *Conferva* I cannot say I have observed myself, but I think it hath been shown me by Mr. Newton. Your *Atriplex maritima folio sinuato candicante angusto* I am not satisfied in. You that saw it growing and green can better judge of it than I by a dried specimen; I make some doubt whether it be of that genus or not, and whether it may not be the *Atriplex angustifolia maritima dentata* [*Atriplex marina*, Linn.] described in our History, p. 193. The seed vessel I cannot discern, and so can affirm nothing, but incline to think it is that.

I thank you for your continued friendship, in so frankly affording me your assistance in carrying on this tedious work I have in hand, and desire you would quicken Mr. Wattes to hasten the accomplishing what he hath promised, that so the [matter] may not be deferred in expectance of his contribution. I do resolve (God granting life and health), with as much speed as strength and leisure will permit, to pursue the work, that so the subscribers may not have reason to complain of delay and frustration. I long to see Dr. Herman's book, which, as you well intimate, will in all likelihood much facilitate the work, and ease Mr. Wattes of much trouble in describing and giving the history of his rarer and nondescript plants. I am, sir,

Your very humble servant,
JOHN RAY.

Black Notley, Aug. 24, —86.

Mr. RAY to Dr. HANS SLOANE.

B. N., April 1, —87.

SIR,—The last week the coachman brought me a second letter from you before I had acknowledged the

receipt of your former, which delay I hope you will impute rather to my incumbrances than negligence; for truly the prosecution of this work I have in hand leaves me but little time to spare. I thank you for the information and intelligence communicated in your first letter. Were it not for the danger and hazard of so long a voyage, I could heartily wish such a person as yourself might travel to Jamaica, and search out and examine thoroughly the natural varieties of that island. Much light might be given to the history of the American plants, by one so well prepared for such an undertaking, by a comprehensive knowledge of the European. Nay (which is more), that history, we might justly expect, would not only be illustrated but much improved and advanced.

The fair specimen you sent inclosed in your last hath informed me concerning the Irish Dulrsh,* for so I think you spell it. I own myself to have been mistaken in it; for it is not the *Alga membranacea purpurea parva* commonly thrown upon our shores, but a plant not observed by me though I take it to be the *Fucus membranaceus ceranoides*, C. B., both from the Scottish name *Dils*, and in that he makes it resemble the *Lactuca marina*, which this very much doth, so that I am in doubt, whether I ought to entitle it a Fucus or Lactuca. It may be denominated *Fucus membranaceus poluschidos Hibernicus viola odore*, which scent is very remarkable in it. In the appendix we may give a more full and perfect history and description of it. I pray the continuance of your correspondence and rest,

Sir,

Your very humble servant,

JOHN RAY.

For Dr. Hans Sloane, at Mr. Wilkinson's
a bookseller, at the Black Boy, over against
St. Dunstan's church, in Fleet Street, London.

* The Dulse of Scotland and Dillesk of Ireland is, according to Greville (Brit. Alg. 94) the *Rhodomenia palmata* (Grev.) The *Iridæa edulis* is called Dulse in the south-west of England.

Dr. Robinson to Mr. Ray.

Sir,—Monsieur Bernier, who passed the Red Sea into Arabia, doth affirm in a private letter, that the Arabs assured him that the coffee fruit was sown every year under trees, up which it did climb and run, from which he concludes it to be a species of Convolvulus. I think he might as well have concluded it to be a *Phaseolus*, or some other scandent legume. If M. Bernier was truly informed of its annual sowing and climbing, then Alpinus never saw the true coffee plant. The Arabians are as careful in destroying the germinating faculty of the coffee fruit or seed, by boiling or burning, as the Dutch of the Moluccas are in their nutmegs. I have spoke with several curious persons that have been several times in Egypt, and they all said that they never saw the coffee plant; neither, as I remember, did Bellonius ever meet with it in that country or Arabia; for the coffee is said only to grow in that part of Arabia that lies within the tropic.

I have examined many coffee berries, as they call them, here at London, and am almost persuaded by my own observation, that they are neither berries nor the seeds of any Convolvulus, nor of any legume, but are rather of the nut kind: the entire fruit is covered with two skins, being round on one side and flat on the other; the exterior skin, or rather shell, being as thick almost as that of a pistachio, is of a dark colour; the second, or interior membrane, that covers the kernels, is much finer and of a yellowish-white colour, as the kernels themselves are. Under this second skin lies generally two kernels, sometimes one, round on one side and flat on the other: on the flat side of the kernel there is always a slit, or a mouth, so that every kernel doth exactly resemble a *Concha Veneris*. The fruit doth generally come to us decorticated, but I, finding some entire, have made this description.

London, May 21, —87.

Dr. HANS SLOANE to Mr. RAY.

SIR,—I send you here inclosed the specimen of a plant growing on Newmarket Heath, and in Surrey, known by the name of Star of the Earth in those parts. It is particularly taken notice of on the account of its extraordinary and admirable virtue in curing the bitings of mad dogs, either in beasts or men. One of his majesty's huntsmen having proved it a great many times, gave the king his way of using it, which was an infusion in wine with treacle, and one or two more simples. His majesty was pleased to communicate it to Gresham College to the Royal Society; and nobody knowing the plant by that name, some there present confirming its use in that disease in some places of England, and procuring the herb itself, it is as little known here as if it had come from the Indies. I told the Society I would let you have this best specimen of it, which I question not but it is known to you. If you please to give your sentiments about it, you will extremely oblige, &c.

London, June 21, 1687.

Mr. RAY to Dr. HANS SLOANE.

SIR,—I received your letter with the specimen inclosed, which seems to me to be the *Sesamoides Salamanticum magnum* of Clusius [*Silene otites*, Sm.], or *Lychnis viscosa flore muscoso* of C. B., which I have observed to grow plentifully upon Newmarket Heath, that part I mean that is in Suffolk, for on Cambridgeshire side I have not found it. I wonder it should have such a virtue as you mention, but it seems it is well attested. Dr. Hulse writes to me he finds it in Graye's 'Farrier.'

If you go to Jamaica I pray you a safe and prosperous voyage. We expect great things from you, no less than

the resolving all our doubts about the names we meet with of plants in that part of America, as the Dildoe, Mammee, Mangrove, Manchinello, *Avellanæ purgatrices*, the Sower-sop, and Custard-apple. Of most of which, though I am pretty well informed and satisfied by Dr. Robinson, yet I shall be glad to be either confirmed or better informed by so knowing and curious an observer as yourself. I should be glad to know what manner of fruit the Mandioca bears; for, whatever some have written, that it is not without, I am confident. You may also please to observe whether there be any species of plants common to America and Europe, and whether Ambergrise be the juice of any sort of metal or aloe dropped into the sea, as Trapham would have it. What kind of Arundo it is the same author calls the Dumbcane, as also what his animal seeds may be. The shining barks of trees which he mentions deserve observation, because I find nothing of them in other writers. I shall not instance in more particulars. I wish your voyage had so long prevented the publication of my history, that I might have been satisfied and informed by you of these and a thousand other particulars, and had so great an accession of new and nondescript species as your inquisitions and observations would have enriched it withal. I take leave, and rest, &c.

RICH. WALLER, Esq. to Mr. RAY.

SIR,—I thought it might not be an unacceptable communication to tell you, that being this last summer at Keinsham, in Somersetshire, and making a search after the *Cornua ammonis*, I found, amongst several of the ordinary snake-stones in which the shelly diaphragms were very visible, one of the true nautilus shape, covered in some places with a shelly incrustation, with the diaphragms to be seen to the centre of the voluta; and in

each diaphragm the hole by which they communicate with one another, by a string or gut in the fish. This was of a very hard stone and large size, weighing at least twenty-eight pounds, though some part was broken off.

London, Feb. 4, 1687.

Mr. Waller to Mr. Ray.

Sir,—Since one of the chief ends of an herbal is thereby to attain a true knowledge of plants, I have adventured to propose my thoughts to you, how by a few tables, with iconisms, one wholly ignorant in plants may know how to find any unknown plant, together with the help of your method and tables in your most exact and elaborate 'Treatise of Plants,' lately published. My thoughts in short are these:

I would, according to your general table of herbs, inserted at page 58, take the two first divisions, imperfect and perfect; giving the figure of any one imperfect plant, as of a fungus or the like. Of a perfect one I would do the same; under the perfect another figure of the minute seeded, viz. a capillary, with a larger seeded plant. This should be my first table. In the second, coming to the larger seeded, I would give the figure of a seed coming out of the ground with two lobes or seed-leaves, beside the plant-leaves (referring the Unifolia to another table, as also all larger plants or trees); under this I would represent an imperfect or staminous flower, and against it a perfect or leafy flower, both compound and simple; and so on throughout all the generic and specific divisions in several tables, which I suppose need not be many, with references to the books and chapters of your Treatise. The use of them will be this: taking any unknown plant, my first inquiry must be whether it has a seed or no; if a seed, whether small or large? if large, whether bivalve or not? &c. By which method proceeding, I shall at

last be brought to find the very plant itself and the place where described at large in your book, my design in these tables being only to give an idea of the difference of plants by pictures (the representations of beings) rather than by words (the representations of pictures). This I submit to your censure before discovering it to others, requesting your thoughts upon it; for it is very possible, that being so unknowing as I am in plants, I may frame an image to myself of that, which, brought to the test, will prove a mere chimera. If so, pray pardon my rashness, and accept of my real desire of advancing knowledge.

I think fit to communicate, that being this last autumn at Bristol, in August the tide brought in floating some of the vesiculiferous sea-wrack; the bladders were some filled with air, some with a slimy water, and in some I found a round (as I suppose) seed, thinly dispersed in a tenacious matter. They were somewhat smaller than rape-seed, and of a brownish colour. This, if a new discovery, may be farther prosecuted. Thus having already troubled you with too large a letter, I beg leave to subscribe myself, &c.

London, April 5, 1688.

Mr. Tho. Lawson to Mr. Ray.*

Mr. Ray,—*Acetosa scutata repens*, C. B. *Acet. rotundis. Westmerlandica Mor.* [*Oxyria reniformis*, Hook], by Buckbarrow Well, in Longsledale; also on little Harterfell Crag, *copiosè*, Westmoreland.

Adiant. petr. perpusillum, sc. [*Hymenophyllum tun-*

* Although the plants mentioned in this letter of Mr. Lawson may be met with in Mr. Ray's books, yet there being many of the northern plants put together in alphabetical order, with the places where they grow, I thought it might be acceptable to the northern botanists to publish the letter as I found it.—W. D[erham]

bridgense; Sm.],* on Buzzard rough Crag, close by Wrenose, in Westmoreland. I was with Ja. Newton when it was found.

Alchimilla alp. quinquefolia [*Alchemilla alpina*, Linn.], by Buckbarrow Well plentifully, as on the rocks between Thornwhait and Mardale, *copiosè*, Westmoreland.

Allium mont. bicorne [*A. carinatum*, Linn.], is doubtless *Al. syl. bic. pur. prol. Chab.*, in Trout Beck Holme, by Great Strickland, Westmoreland.

Alnus nigra baccifera, J. B. [*Rhamnus Frangula*, Linn.], in Thorny Holme, in Whinfield Forest, Westmoreland.

Saxifr. gram. sc. Cat. Cant. [*Sagina procumbens*, Linn.], called in your history, *Sax. gram. pusil. fl. parvo tetrapetalo.* Hereof I found another species, *Foliis brevioribus crassioribus et succulentioribus* [*Spergula subulata*, Sw.], on Whinneyfield Bank, by Cullercoats by Tynemouth, in Northumberland.

Anagallis aquat. minor fol. subr., C. B. [*Veronica Beccabunga*, Linn.] *Anagal. aquat. min. fol. oblong.*, C. B. [*V. Anagallis*, Linn.] Both *fl. albo*, about Shap, in Westmoreland.

Anag. aquat. rotund., Ger., *Samolus Valerandi* [*Samolus Valerandi*, Linn.], at Marshgrainge, in Furneis, and between Bare and Pulton, nigh Lancaster, on the sea-bank.

Anchusa degener fa. mil. solis [*Lithospermum arvense*, Linn.], on Lansmoor, near Great Strickland. It is not plentiful with us, Westmoreland.

Androsæmum vulg., Park. [*Hypericum Androsæmum*, Linn.], in the Lady Holme, in Winander Mear, Westmoreland.

Apium palustre seu off., C. B. [*A. graveolens*, Linn.], near Cartmall Medicinal Well, on the Marsh Ditches, Lancashire.

Armeria prat., Ger., *fl. albo* [*Dianthus Armeria*, Linn.], at Orton, Greatstrick, Westmoreland, and by Penigent, in Yorkshire.

* Perhaps more correctly *H. Wilsoni*, Hook.—C. C. B.

Aria Theophrasti, Ger. [*Pyrus Aria*, Sm.], Witherslack, Consick Scar, Silverdale, Arnside, places in Lancashire and Westmoreland, where they call it Chess-apple and Sea-oulers. It is *Sorbus alpina*, J. B.

Asplenium, J. B. [*Ceterach Officinarum*, Willd.], on Troutbeck Bridge, near Winander Mear, *copiosè Barba Neptuni*. Mrs. Warde, of Gisborough of Cleinelayne, in Yorkshire, first observed this and called it Sea-bird: she showed it to me and after to Mr. Newton, who called it *Bar. Neptuni*. She is very knowing in plants.

Betonica aquat., Ger. [*Scrophularia aquatica*, Linn.], at Allythwait, nigh Cartmal, Lancashire, *copiosè*.

Bifolium minimum, J. B. [*Listera cordata*, R. Br.], by the Picts' Wall, in Northumberland.

Bistorta minor, Ger. [*Polygonum viviparum*, Linn.], at Crosby Ravensworth, in Westmoreland, *copiosè*.

Bryonia alba, Ger. [*B. dioica*, Jacq.], near Darlington, all along the horse-way to Thornton, in the bishopric of Durham, *copiosè*.

Buglossum luteum, Ger. [*Picris echioides*, Linn.], betwixt Stockton and Norton, in the bishopric of Durham, plentifully.

Bursa past. minor. Nastur. petr. Tab., [*Teesdalia nudicaulis*, R. Br.], by Common Holme Bridge, near Clibburn, in Westmoreland.

Campanula Cymbalariæ fol., Ger. Emac. [*Wahlenbergia hederacea*, Reich.], in Bagley Wood, near Oxford, I observed it.

Cardamine, Ger. [*C. pratensis*, Linn.], *fl. pleno*, on Little Strickland pasture, Westmoreland.

Carduus nutans, J. B. [*C. nutans*, Linn.], by Hardindale Nab, Westmoreland.

Card. stellat., Ger. [*Centaurea Calcitrapa*, Linn.], betwixt the Glasshouses and Dent's Hole, nigh Newcastle-upon-Tyne, in Northumberland.

Card. monstrosus Imperati [*Carlina vulgaris*, Linn. ?] in a limestone quarry in Great Strickland field, Westmoreland.

Caryophyllata purpurea prolifera fl. amplo [a double-

flowered variety of *Geum rivale*, Linn.], by Great Strickland, Westmoreland.

Caryophyllus mar. minimus, Ger. [*Armeria maritima*, Willd.], in Bleaberry Gill, under Hinckell Haugh, at the head of Stockdale fields in Craven, Yorkshire, far from the sea.

Caryophyllus virgin., Ger. [*Dianthus deltoides*, Linn.], on a sandy hill, a little below Common Holme Bridge, where the water is crossed near Great Strickland, Westmoreland.

Catanance leg. quorundam, J. B. [*Lathyrus Nissolia*, Linn.], between the Glasshouses and Dent's Hole, nigh the North Shore-house by Newcastle-upon-Tyne, *copiosè*.

Centaurium luteum perfol., C. B. [*Chlora perfoliata*, Linn.], in many places by Worcester and Gloucester.

Centaurium min., C. B., *fl. albo* [*Erythræa centaurium*, Pers.], by Cartmall Medicinal Well, Lancashire.

Cerasus syl. fructu min. cordiformi, Ph. Br. [*Prunus Avium*, Linn.],* nigh Stockport, in Cheshire, at Bery or Bury, in Lancashire, at Rosgill, in Westmoreland. In all these places it is called Merry-tree. I could observe no difference from other cherry-trees, save in its small cordiformous fruit.

Chamæcistus vulgaris fl. albo [*Helianthemum vulgare*, Gaert.] On Gogmagog's Hill I gathered it.

Alysson Dioscor. montanum, Col. [*Veronica montana*, Linn.], at Lartington, in Yorkshire, near Bernard Castle, in Buckham, belonging to Sir John Lowther, Westmoreland.

Chamæmorus, Ger. [*Rubus Chamæmorus*, Linn.], between Bannisdal Head and Water Sledale, as on Crossfece, Westmoreland.

Christophoriana, Ger. [*Actæa spicata*, Linn.], among the shrubs by Malham Cove, Yorkshire.

Cochlearia marina fol. anguloso parvo [*Cochlearia danica*, Linn.], in the Isle of Waney, Lancashire. I pur-

* See Leighton's 'Flora of Shropshire' (pp. 523-7) concerning this and the *P. Cerasus*, Linn., which have usually been confounded by English botanists.—C. C. B.

pose soon after Pentecost to send fair samples and seeds. I saw nothing to distinguish it from the rest but its little cornered leaves.

Conyza major Mat. sc. J. B. [*Inula Conyza*, De Cand.], by Cartmall Medicinal Well, Lancashire.

Conyza cær. acris, C. B. [*Erigeron acris*, Linn.], on the old walls by Sawley Abbey, Lancashire.

Cotula non fœtida pleno fl. [*Pyrethrum inodorum*, Sm.], at Great Strickland, Westmoreland.

Cotyledon hirsuta, P. B. [*Saxifraga stellaris*, Linn.], by Buckbarrow Well, in Longsledale, Westmoreland, *copiosè*.

Crithmum mar. spinosum sc. Park. [*Echinophora spinosa*, Linn.], at Roosbeck, in Low Furneis, Lancashire.

Digitalis fl. albo [*Digitalis purpurea*, Linn.], in a close called Millbank, at Lorton Town End, in Cumberland, *copiosè*.

Dryopteris alba Dodonei, Ger. Emac. [*Cystopteris fragilis*, Bernh.]; *Dryopt. nigra Dod.* [*Asplenium Adiantum-nigrum*, Linn.]; *Dryopt. Tragi.* [*Polypodium Dryopteris*, Linn.]; these three I found plentifully in a place called Trowgill, near Clibburn, Westmoreland.

Echium mar., P. Br. [*Stenhammaria maritima*, Reich.; *Pulmonaria maritima*, Linn.], by Whitehaven, in Cumberland, and also over against Bigger, in the Isle of Wanoy, *copiosè*.

Elæagus cordi [*Myrica Gale*, Linn.], by the rivulet between Shap and Anna Well, Westmoreland.

Elatine fol. acum., Park. [*Linaria Elatine*, Mill.]; *Elatine fol. subrot.*, C. B. [*L. spuria*, Mill.]; both these I observed on Stanhill, west of Henley Wood.

Equisetum sive hippuris lac. fol. mansu aren., Gesn. [*Chara hispida*, var. Linn.], in Hell Kettles, nigh Darlington, in Conzick Tarn ditches, Westmoreland.

Eruca marina, Ger., *Cakile sc.* [*Cakile maritima*, Willd.] at Roosbeck, in Furneis, as also in the Isle of Waney, Lancashire.

Eruca Nasturtio cognat. tenuifolia, P. B. [*Vella annua*, Linn.], on Salisbury Plain.

Eruca monensis lacin. lutea [*Sinapis monensis*, Bab.], between Marshgrainge and the Isle of Waney, Lancashire, in Sella Fields, Sea Bank, Cumberland. I purpose to observe this in the Isle of Man, at Pentecost.

Eryngium vulg. J. B. [*E. campestre*, Linn.], on the shore called Fryer Goose, near Newcastle-upon-Tyne.

Ferrum equinum, Ger., *sil. in summ. sc.* C. B. [*Hippocrepis comosa*, Linn.], on the rocks by the rivulet that runs from Anna Well towards Shap, Westmoreland.

Filipendula, Ger., J. B. [*Spiræa filipendula*, Linn.], on the top of Conzick Scar, *copiosè*, Westmoreland.

Fumaria alba latifolia, Park. [*Fumaria claviculata*, Linn.], at Thornwhait, foot of Longsledale, on the thatched houses in Kentmeer, Isan Parles Cave mouth, *copiosè*, Westmoreland.

Fumaria major scandens [*F. capreolata*, Linn.], in Great Strickland, Westmoreland.

Fungus Phalloides, J. B. [*Phallus impudicus*, Linn.], in Croft Short Close, by Great Strickland.

Geranium batrachoides, fl. elegantèr variegato [*G. sylvaticum*, Linn.], in Old Deer Park, by Thornwhaite, Westmoreland.

Ger. hæmatodes fl. elegantèr variegato [*G. sanguineum*, Linn., β. *prostratum*; *G. lancastriense*, With.; *G. prostratum*, Cavan.] Thousands hereof I found in the Isle of Wancy, and have sent roots to Edinburgh, York, London, Oxford, where they keep their distinction.

Gladiolus lacustris Clusii, sc. Park. [*Lobelia Dortmanna*, Linn.] This I found in Winander Mear, *copiosè*, and in Grayson Tarne, near Cockermouth, Cumberland.

Gladiolus palustris Cord., Ger. [*Butomus umbellatus*, Linn.] This I observed betwixt Tewksbury and Gloucester, in the ditches.

Glaux Dioscor., Ger. [*Astragalus hypoglottis*, Linn.], close by Huntcliff Rock, in Cleveland, Yorkshire.

Glaux vulg. Ad. Lob. [is this *Glaux maritima*, Linn.?], on the shore called Fryer Goose, by Newcastle-upon-Tyne.

Gnaphalium mont. album, Ger. [*Gnaphalium dioicum*, Linn.], by the Force, between Anna Well and Shap, on Sir John Lowther's pasture, between Lowther and Hackthorpe, Westmoreland.

Gramen triglochin, J. B. [*Triglochin palustre*, Linn.], by the rivulet between Shap and Anna Well, Westmoreland.

Gramen sparteum capite bifido vel gemino,* betwixt Hackthorpe and Lowther, *copiosè*, Westmoreland.

Hederula aquatica, Ger. [*Lemna trisulca*, Linn.], in ditches between Warton and Cornforth, Lancashire.

Helleborine minor alba, Park. [*Cephalanthera grandiflora*, Bab.], in Sir John Lowther's wood, directly against Askham Hall, Westmoreland.

Helleb. flore atro rubente, Park. [*Epipactis ovalis*, Bab.], in the lane by Abbot Wood Close, near Great Strickland, Westmoreland.

Hieracium Macrocaulon hirsutum fol. rotundiore [*H. murorum*, Linn.] This I found by Buckbarrow Well, in Longsledale, and on the rocks by the rivulet between Shap and Anna Well, Westmoreland; expect fair samples and my description.

Hipposelinum, Ger. Emac. [*Smyrnium olusatrum*, Linn.], within and without the walls of Scarborough Castle, *copiosè*, Yorkshire.

Hypericum elegant. non ramosum fol. lato, J. B. [*H. montanum*, Linn.], on Conzick Skar, by Kendal, on the rocks by the rivulet between Shap and Anna Well, Westmoreland.

Hypericum pulchrum Tragi, J. B. [*H. pulchrum*, Linn.], in Trowgil, near Clibburn, Westmoreland.

Jacobæa latifol. palustris [*Senecio aquaticus*, Huds.], at Great Strickland, in the watery places by Clibburn Bridge, Westmoreland.

* This may be *Ammophila arenaria*, Link, *Arundo arenaria*, Linn., but the station requires examination.—C. C. B.

Juncus acutus cum caudâ Leporinâ, J. B. being *Gramen junceum montanum subscæruleâ spicâ Mer.* [*Eriophorum vaginatum*, Linn.] It is always *Spicâ simplici.* Its bluish spikes appear soon after Christmas. After it turns white sheep are greedy after it; so it is called Moss-crops about Clibburn, Water Sledale, and in all places here—Westmoreland.

Lactuca Agnina, Ger. [*Valerianella olitoria*, Moench.], about the bank of the Roman fort Maburg, nigh Round Table, Westmoreland.

Ladanum segetum sc. J. B. [*Galeopsis Ladanum*, Linn.], on Lansmoor, near Great Strickland.

Lapathum pulchrum bononiense, sc. J. B. [*Rumex pulcher*, Linn.], betwixt the inn and the smithy at Sir John Lowther's new town, Westmoreland.

Lathyrus major latifolius, Ger. Emac. [*L. latifolius*, Linn.],* on the rocks by the Red Neese, by Whitehaven, *cop.* Cumberland.

Laureola, Ger. [*Daphne Laureola*, Linn.], by Thornton, in the bishopric of Durham.

Lilium convallium, Ger. [*Convallaria majalis*, Linn.], in Witherstack Park.

Lilium convallium angustifolium [*C. majalis*, var.], on the Skar, near Waterfall Bridge, by Great Strickland, and in other places, Westmoreland.

Linum syl. fl. cæruleis, Ger. Emac. [*Linum perenne*, Linn.], at Crosby Ravensworth, and between Shap and Threaplands, Westmoreland.

Lunaria ramosa, and *Lunaria crenata* [*Botrychium Lunaria*, Sw.], grow in Croft Short Close, by Great Strickland, Westmoreland.

Marrubium aquaticum [*Lycopus europæus*, Linn.], in the moss by Hawkshead, Lancashire.

Melilotus vulgaris, Parkinson [*Melilotus officinalis*, Lam.], by Langanby, Cumberland.

* It appears that the late Mr. Winch only met with the *L. sylvestris*, Linn., at the place mentioned by Mr. Lawson.—C. C. B.

Mentastrum folio rugoso rotund. sc. J. B. [*Mentha rotundifolia*, Linn.], by Marshgrainge, in Lancashire.

Millefolium aquaticum dictum Viola aquatica, J. B. [*Hottonia palustris*, Linn.], in the river Kent, by Kendal, Westmoreland.

Mil. palustre galeric. Ger. Emac. [*Utricularia vulgaris*, Linn.], and *Mil. pal. gal. minus fl. minore* [*U. minor*, Linn.], in the ditches by the causeway over the moss to the Fell-end, near Witherstack.

Millegrana minima, Ger. [*Radiola millegrana*, Sm.], on Clifton Moor and Clibburn Moor, Westmoreland.

Morsus Diaboli, Ger., *flore albo* [*Scabiosa succisa*, Linn.], at Great Strickland, Westmoreland.

Dendrobryon geniculatum, Col. [*Usnia barbata*, Ach.], near Kendal, Westmoreland.

Muscus cupressiformis, Park. [*Lycopodium alpinum*, Linn.], by Buckbarrow Well, in Longsledale, Westmoreland.

Muscus terrestris repens clavis singularibus, sc. J. R. [*Lycopodium inundatum*, Linn.], towards the foot of Longsledale, Westmoreland.

Muscus terrestris polyspermos [*Lycopodium selaginoides*, Linn.], by Buckbarrow Well, Westmoreland.

Myrrhis syl. seminibus asperis, C. B. [*Anthriscus vulgaris*, Pers.], on mud-walls at Blackwell, in the bishopric of Durham, on mud-walls in Burlington, Yorkshire.

Numularia minor, sc. C. B. [*Anagallis tenella*, Linn.], at the foot of Longsledale, and near the Cloven Stone, on Great Strickland Moor, Westmoreland, *copiosè*.

Œnanthe Cicutæ-facie, Lob., Park. [*Œnanthe crocata*, Linn.], about Kendal and Hiltondale, Westmoreland, *copiosè*, where it is commonly called Dead Tongue; in the water-course of St. John's Well, by St. John's Chapel, in or near Scelsmoor, three miles from Kendal.

Orchis palmata rubella cum longis calcaribus rubellis, J. B. [*Gymnadenia conopsea*, R. Br.], in Troutbeck Holme, by Great Strickland, Westmoreland, where it is also found *flore niveo, et fl. carneo*.

Orchis sphegodes sive fucum ferens, Park. [*Ophrys aranifera*, Huds.], in the close on the west side of Charlton church, in Kent, *copiosè*.

Orchis myodes, Ger. [*Ophrys muscifera*, Huds.], in the lane or way between Holm-park House and the crag; also in the wood there pretty plentifully, Westmoreland.

Ornithogalum luteum, C. B. [*Gagea lutea*, Ker.], in the bushes at Bander Bridge-end, by Cotherstone, near Rombald church, Yorkshire.

Ornithopodium minus, Ger. [*Ornithopus perpusillus*, Linn.], on Clibburn Ling, near Common Holm Bridge, *copiosè*, Westmoreland; nigh Ravenglass, Cumberland.

Pedicularis pratensis vulgaris fl. albo [*Pedicularis sylvatica*, Linn.], at Gunnerthwaite, in Lancashire; at Great Strickland, Westmoreland.

Pedicularis palustris elatior fl. albo [*P. palustris*, Linn.], in the lower end of Longsledale, Westmoreland.

Pentaphylloides fruct. [*Potentilla fruticosa*, Linn.], by Mickle-force, in Teesdale, *copiosissimè*.

Persicaria siliquosa, Ger. [*Impatiens noli-me-tangere*, Linn.], by the cloth-mill in Saterthwait parish, Lancashire, and in many places of Westmoreland.

Phyllitis multifida, Ger. [*Scolopendrium vulgare*, Linn.], on the rock by Cartmall Medicinal Well, Lancashire.

Plantago aquat. minor, Park. [*Alisma ranunculoides*, Linn.], near the Cloven-stone on Great Strickland Moor, Westmoreland.

Plantago aquat. minor stellata, Ger. Emac. [*Actinocarpus Damasonium*, R. Br.], on Clapham Heath, in Surrey.

Polygonum mar., J. B. [*Polygonum Raii*, Bab.], on the shore between Workington and Whitehaven, Cumberland.

Populus libyca, Ger. [*P. tremula*, Linn.], in St. Herbert's Isle, in Derwentwater, Cumberland.

Primula pratensis inodora lutea, Ger. *veris caulifera*, *sc.* J. B. [*Primula vulgaris var. umbellata* probably]. Great

Cowslips. This, in the north, is commonly called Lady Candlestick.

Ptarmica fl. pleno [*Achillea Ptarmaca*, Linn.], in the small holm in Winander Mear, Westmoreland.

Pyrola brasiliana, Park. [*P. rotundifolia*, Linn.?], by Guisborough, in Cleveland, Yorkshire. It grew in my garden several years; whether his *major* or *minor* I was not satisfied.

Ranunculus flam. major, Ger. *Lingua Plinii*, J. B. [*Ranunculus Lingua*, Linn.], in the water and ditches of the moss by Hawkshead, in Lancashire.

Ranunculus nemorosus dulcis secundus Tragi, Park. [*R. auricomus*, Linn.], *in dumetis, copiosè*, particularly in Sheriff Park, by Great Strickland, Westmoreland.

Ranunculus palustr. rotundifolius, Ger. [*R. sceleratus*, Linn.], by Robin Hood's Well, nigh Wentbridge, Yorkshire; by Middleton, near Lancaster.

Reseda vulgaris, C. B. [*R. lutea*, Linn.], by Clifford's Fort, at Tinmouth Castle, in Northumberland, *copiosè*.

Rhamnus catharticus, J. B. [*R. catharticus*, Linn,], in the rocks and hedges by Great Strickland, Westmoreland, *copiosè*.

Rhamnus secundus Clusii, Ger. Emac. [*Hippophae rhamnoides*, Linn.], on the sea bank between Whitby and Lyth, Yorkshire, *copiosè*.

Ros solis fol. oblongo, C. B. [*Drosera longifolia*, Linn., Sm.]; *Ros solis fol. rotundo*, Ger. [*Drosera rotundifolia*, Linn.]; both these in Mosey Mire, in Witherslack, Westmoreland.

Rosmarinum syl. minus nostras, Park. [*Andromeda polifolia*, Linn.], in Brigsteer Moss, not far from Kendal, Westmoreland; in Middleton Moss, by Lancaster.

Rubia cynanchica, J. B. [*Asperula cynanchica*, Linn.], on Beltharrow, in Witherslack Park, and on the top of Conzick Scar, near Kendal, *copiosè*, Westmoreland.

Ruscus, J. B. [*R. aculeatus*, Linn.], on Westwood Common, nigh Sydenham, in Kent, not scarce.

Saponaria fl. pleno [*Saponaria officinalis*, Linn.], at Carnforth, in Lancashire.

Saxifraga palustris Anglica, Park. [*Spergula nodosa*, Linn.], in Troutbeck Holm, by Great Strickland, Westmoreland.

Scabiosa minor prat. fl. carneo, Park. [*S. columbaria*, Linn.], in the closes between Melkinthorp and Waterfall Bridge, Westmoreland.

Scrophularia major, Ger. [*Scroph. nodosa*, Linn.], by Waterfall Bridge, and in many other places in Westmoreland, where the common people call it Hastie Roger.

Sedum alpinum trifido folio, C. B. [*Saxifraga hypnoides*, Linn.], by Maltham Cove, Yorkshire; among the rocks south of Sir John Lowther's, Westmoreland.

Senecio hirsutus viscidus major odoratus, J. B. [*S. viscosus*, Linn.], about Sunderland; nigh Lancaster.

Serratula fl. albo [*Serratula tinctoria*, Linn.], in a close by Hampstead Heath, and on Sowfield, by Great Strickland, in Westmoreland.

Sium minimum, J. R. [*S. inundatum*, Linn.], near Cloven-stone, in the sike on Great Strickland Moor; in a watery place by the Roman fort called Maburg, Westmoreland.

Soldanella marina, Ger. [*Convolvulus Soldanella*, Linn.], in the Isle of Waney, Lancashire.

Ornus sive Frax. sylvestris, Park. [*Pyrus Aucuparia*, Gaert.], in the scars nigh Waterfall Bridge, in the north. It is known by the name of Rawn, or Rown-tree, or Rone-tree, Westmoreland.

Sorbus torminalis, Ger. [*Pyrus orminalis*, Sm.], in Levens Park, near the bridge, Westmoreland.

Stellaria aquatica, Park. [*S. uliginosa*, Murr.], in the ditches of Middleton Moss, Lancashire. Here I saw it in flower.

Thalictrum majus, Ger. [*T. majus*, Crantz], by Cartmall's Old Well, near the Medicinal Well, Lancashire.

Thalictrum minus, Ger. [*T. minus*, Linn.], in the Isle of Waney, *copiosè*, Lancashire.

Tormentilla fl. pleno [*Potentilla tormentilla*, Nesl.], at Temple Sourby, in Westmoreland.

Filix marina Anglica, Park. [*Asplenium marinum*, Linn.], under a shadowy sea rock by Middleton, near Lancaster.

Pneumonanthe, Ger. [*Gentiana Pneumonanthe*, Linn.], on Red, or Rud Heath, in Cheshire, *copiosè*. Also near Clapham, in Yorkshire.

Trachelium minus fl. albo [*Campanula glomerata*, Linn.], in Troutbeck Holm, by Great Strickland, Westmoreland.

Trifolium album umbellâ sil., Mer. [a monstrosity of *T. repens*, Linn.], betwixt Virginia House and Nag-head Inn, in the way to Hackney, London.

Trifol. pumilum supinum flos. longis albis, P. B.; *Trifol. subterraneum tricoccon*, Mor. [*T. subterraneum*, Linn.], on Blackheath, in Kent. It grew in my garden.

Trepolium, sc. [*Aster tripolium*, Linn.], Isle of Waney, Lancashire.

Turritis, Ger. [*T. glabra*, Linn.], at Clibburn, Westmoreland.

Vaccinia nigra, Ger. [*Vaccinium myrtillus*, Linn.]; *Vac. nigr. fruc. maj.*, Park. [*Vaccinium uliginosum*, Linn.]; *Vaccinia rubra*, Ger. [*Vac. vitis-idæa*, Linn.]; *Vac. palustria*, Ger. [*Vaccinium Oxycoccos*, Linn.],—all grow in the forest of Whinfield, Westmoreland.

Verbena vulg. J. B. [*Verbena officinalis*, Linn.], at Cockermouth, in Cumberland, plentiful.

Viola mont. lutea grandiflora, C. B. [*V. lutea*, Huds.], by Elden Hole, in Derbyshire; Malham Cove, in Yorkshire; on Stanmoor, in Westmoreland, abundantly.

Virga aurea, Ger. [*Solidago Virgaurea*, Linn.], in Clibburn Field, Westmoreland, abundantly.

Umbilicus Ven., Ger. [*Cotyledon Umbilicus*, Linn.], at Oxford, and about Bristol, *copiosè*.

As for *Orchis palmata pal. mac.*, Park., and his *Orchis pal. pal. dracontias*, in my judgment you have truly referred them. I have consulted Park. and Ger. Emac., and see no reason to distinguish them. Pray consult

Park. and Lobel. Lobel I have not. Park., I suppose, distinguishes them upon his authority. I purpose to mind them in this following season.

Great Strickland, April 9, —88.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Jan. 8, —89.

SIR,—Not long since one Mr. Pratt, a gardener, a person (as himself told me) well known to you, who now lives with Sir Thomas Willughby, son and heir of my worthy friend and benefactor, Francis Willughby, Esq., being here with me, and hearing that you were returned from Jamaica, and had brought over with you, among many other natural varieties, divers seeds not common, by you discovered in that and the neighbouring islands, engaged me to write to you to entreat you, if you have not already disposed of them, to communicate some part to Sir Thomas, who, I know, will be very thankful to you for them. Mr. Pratt will take care of them, and part of the product you may command.

Being advised by Dr. Robinson that my first letter, in answer to yours, miscarried, I wrote a second, which I hope came to your hands. I should be glad to hear what progress you have made in order to the publishing your curious observations and discoveries, whereby you will much oblige the learned naturalists of this age, and erect a lasting monument to your own memory.

I am, sir,
Your very humble servant,
JOHN RAY.

For Dr. Hans Sloane,
to be left at Mr. Wilkinson's, at the Black Boy,
over against St. Dunstan's Church, in Fleet street, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, October 21, —89.

SIR,—I was much troubled when I was advised by Dr. Robinson that my letter, in answer to yours of August 3, came not to your hands, the subject whereof was to give you thanks for your intended visit, and to tell you how glad I should be to see you (when your occasions should draw you this way) at my poor habitation at Black Notley, and be made partaker of some part of your discoveries and observations; to encourage you in your design of publishing the fruits of your travels in the New World; to offer you any assistance I could afford; and finally (which should have been first mentioned) to congratulate your safe return into England. I was long in hope and expectation of seeing you here, and wondered that you came not, nor sent any word of the alteration of your purpose, and the reason of it. I also (which I had forgot) in the same letter returned you many thanks for the present of seeds you designed me. The days are now so short, and the ways and weather so unfit for travel, that I have little hopes of seeing you here this winter, unless your occasions should engage you to take a journey to New Hall (which is not above eight miles from us), and then I entreat you would make a further step hither, where you shall be most welcome to,

Sir,

Your very humble servant,

JOHN RAY.

For Dr. Hans Sloane,
at Mr. Wilkinson's, a bookseller, at the Black Boy,
over against St. Dunstan's Church, in Fleet street, London.

Mr. Lhwyd* to Mr. Ray.

Honoured Sir,—The same varieties of Entrochi, with those you sent me, are found in Staffordshire, but I had none exactly like them; for, though I picked up some variety of them in Wales, yet they all differ from these in texture, consistence, and colour. About Oxford we have considerable variety of formed stones, more than Dr. Plot has mentioned in his history; but no Entrochi were ever found in this county that I have heard of. If any one of these formed stones may be acceptable to you, I can send you a parcel whenever you please to command it.

Dr. Morison's first tome, which, with the second already printed, contains all the herbaceous kind, is ready for the press. Pray excuse this hasty scribble, and repute me, &c.

Oxford, Feb. 25, $16\frac{83}{84}$.

Mr. Lhwyd to Mr. Ray.

Honoured Sir,—Dr. Lister acquaints me that Mr. Charlton has lately received a land-snail from Surinam, not bigger than a hen's egg, which yet lays eggs as big as those of a sparrow; and the snails that are hatched of them are, he says, twice as large as the eggs.

Sir, I thank you for your pattern of the *Muscus denticulatus major*. One Mr. Richardson, a gentleman of Yorkshire (a person very curious about plants, and the other parts of natural history, and that has spent about six or seven years with Dr. Herman in that study), told me he was somewhat secure that plant grew in Yorkshire, under the heaths, and promised to send me patterns of it this summer.

I only expect your commands for some figured stones.

* See Appendix B.

Those that this country affords are chiefly in imitation of shells. We have none that resemble fish, or any other animals besides, nor that have the resemblance of any plants. *Cornu Hammonis*, *Asteriscus*, *Asteria S. Astroites*, and *Belemnites* of divers sorts, we have plentifully, as also some others that I cannot compare to any natural bodies that I have any notion of. One quarry within two miles of Oxford I have searched at least forty times, and sometimes had five or six with me; yet last Saturday I discovered there three varieties of *Glossopetræ*, though none had ever been observed in this part of England before, for what I can learn. One of them is a *Tricuspis*, such as Dr. Lister's in one of the 'Phil. Transact.'

Oxiord, April 14, 1690.

Mr. Ray to Dr. Robinson.

Sir,—Concerning the Catalogue of Local Words, I shall add nothing till I hear farther from you, save that a friend, whom casually I met withal last week, asked me concerning that catalogue, and told me that he had made a collection of a few words proper to this county, which he was willing to communicate, in case the book came to a second edition.

Upon this occasion I cannot but take notice that, as if Divine Providence governed even such small matters, when I have been about to publish, or in publishing a work, there have been casually offered to me, without my own or friends' procurement, at that very time, some assistance or contributions by mere strangers, and such as knew nothing of the present publication, or at least such as I made no address to, nor expected anything from. Mr. Lhwyd lately wrote me word of a strange snail Mr. Charlton had received from Surinam, which was not above the bigness of a pullet's egg, yet laid an

egg as big as a sparrow, and that the young one hatched of it was twice as big as the egg, of which particulars I desire confirmation from you.

Black Notley, May 16, —90.

Dr. ROBINSON to Mr. RAY.

SIR,—Mr. Charlton has such a snail-shell, as you mention, with eggs and young ones, which are the wonder of our philosophers here; but I being naturally too jealous, do almost suspect (though I durst never declare my suspicion, the thing appearing clear to everybody besides myself) that the eggs and young ones have been severally, and very artificially added to the snail, though indeed the snails are oviparous, and peradventure perfect-shelled animals may be observed in the eggs themselves; so that I may be under an unreasonable doubt.

London, May 17, —90.

Dr. PLUKENET's Observations on Mr. RAY's Synopsis Stirp. Britan.*

Page 57. SIR,—The laborious Parkinson was indeed mistaken when he confounded the *Chamæm. vulg.* [*Matricaria Chamomilla*, Linn.] that grows among corn with the *Nobile* [*Anthemis nobilis*, Linn.], or Roman kind; and we are not a little obliged to your learned and piercing observation for the discovery of it; but I cannot readily submit that the *Chamæm. flor. pl.* (which we have so common in gardens, or the naked sort) should either of them be varieties of this *Amarum* [*Matricaria Chamomilla*, Linn.], kind, since they are both very fra-

* It is the first edition of the 'Synopsis,' published in 1690, to which this letter refers.—C. C. B.

grant, and creeping upon the ground, and nothing different, but in those very accidents of flowering, from that which grows trailing on our commons, which, however erroneously styled *vulgar.*, yet in reality is the Roman, or noble sort of *Chamæm.* But that which ordinarily goes under the name of *Cotula fœtida fl. plen.*, which I once found in some plenty on the high road from London to Barnet, about half a mile short of the town, is both upright in its stalk, and of no scent at all; and this I dare pronounce to be the double of the *Chamæm. arvor. vulg.*, which I take also to be different from the *Cotula fœtida Dod.* [*Anthemis Cotula*, Linn.], or *Chamæm. inodorum*, C. B. P., of which sort I never yet beheld any with a double flower. I must needs own that Dr. Morison, in 'Prælud.' 249, relating there how frequently this *Cotul. inod. sem. nigr.* did occur to him upon the coasts of Bretagne, in France, assigns our double flowering to a variety of this, assuring it also to produce seed of a like hue. I will not question the doctor's seeing the seed (though double-flowering plants seldom bear any), because he seems to be very positive in it; nor indeed was I ever so curious to observe it, not having seen a growing plant for above these twenty years, and so am ignorant of its colour; but the mien and air, the total habit of this multiplex kind, of which I still retain a firm idea in my mind—the lower stature of it, though upright, the brisk and vivid colour of its leaves, the fewer branchings of its stalk, the lesser compass of its double flowers, and shorter lengths of its fine-cut leaves—in all which the *Chamæm. vulg.* differs from the *Cotula inodora*, which bespeak it to appertain rather to the former; of which in my Catalogue I have made it a more immediate variety.

Page 61. There is a *Limonium minus* [*Statice spathulata*, Desf.] said to grow with us in the north of England, and which I have observed in gardens: perhaps the same sort that Parkinson asserts Lobel to have found about Colchester. The most peculiarity that I could

observe, beside that of its being smaller than our common, was a foliaceous wideness on the pedicle of each leaf, even to its insertion to the root or stalk; whereas our common has a slender, round, and nervous pedicle, for a considerable distance towards the leaf.

Page 64. Although you seem to suspect the *Archangel. Dod.*, Clus., to be the same growing on mountainous places with the common *Angel. sylv.* [*A. sylvestris*, Linn.] in our meadows, and so difference of place only to make the diversity, I assure myself they are specifically diverse; and the *Scandiaca** has this peculiar, that it produces its umbels not only a-top, but also on the side of the stalk, two or three *ex alis foliorum*, and sometimes one or two along the upper stalks without any leaf at all; and I have seen it above seven feet high.

Page 247. Among the *emendanda* I find a query about the *Cnicus spinosior* of the Parisian Catalogue, which I take to be no other than that perennial sort you set down in your incomparable 'Cat. Angl.,' and observed it to grow plentifully at lesser distances from the sea, both in Italy, Sicily, and the more southern tracks of France, whose resemblance, though it come well nigh that figure in Clus., under the title of *Carlina sylv.*, which I esteem no more than our spontaneous annual sort, yet certainly it seems more nearly to respond the *Heracantha*, Tab. Ic. 697, both as to its figuration and manner of growing, putting forth its flowers in the way of an umbel. And though this be made use of as a synonyme to express the foregoing common kind, as we find it even in C. Bauh. himself, yet I am inclined to believe this very *Heracantha* is nothing different from the *Cnicus* of the Parisians, and in all likelihood the same with the *Cnicus sylv. spinosior polycaph.* of the same C. Bauh.; not, therefore, to be accepted for our common kind, nor indeed the *Acarna S. Acorna altera Apula column.*, which latter, both from the Fabian description

* This appears to be a mountain form of *Angelica Archangelica*, Linn., but not a native of Britain.—C. C. B.

of it, and synonyme of C. Bauh., which seems by him particularly adapted from the parvity of its flowers and heads, must be quite another thing. But what this is I cannot determine, as never having seen the plant, and therefore do submit it to your most excellent and discretive judgment.

The *Polygala repens nivea*, C. B. P., *repens nuperor*, Lob., I do readily grant is a *Polygonum*, but extremely differing from the *Polyg. Serpylli folio verticillat.* Cat. Angl., *parvum fl. albo verticillat.*, J. B. [*Corrigiola littoralis*, Linn.], which comes under a much nearer resemblance to the *Polyg. muscosum*, P. Bocc., though it be very different from this too, as by collating the plants themselves, I having them by me, you will easily perceive.

That pretty *Polygonum* [*Glaux maritima*, Linn.] Mr. Newton found in Cornwall, myself upon the Severn shore, cannot be the —— *Pusillo vermiculato Serpylli folio*, J. B., *Serpylli folio*, Lob., Park. [*Frankenia lævis*, Linn.], if at least the figure of it among authors does any way agree with the thing, since the leaves of this are round and shining, but nothing of a Stonecrop shape; and, therefore, as you have given it the honour of a place in the Appendix of your learned Synopsis, you may find I have given it a different name, viz. *Polygonum maritimum longius radicatum nostras Serpylli folio circinato crassonitente;* and perhaps it is the same with the *Polygon. minus lentifolium*, C. B. P. [*Herniaria lenticulata*, Linn.*], as I have there set down my suspicion.

The *Gnaphalium maritimum* [*Diotis maritima*, Cass.] you have ranged, without any remark, among the pappescent† of that kind, when Breynius, in Prodr. 2, assures it hath solid seed.

Page 54. The *Carduus leucographus hirsutus capitulo*

* To which Linnæus has also erroneously referred this plant of Plukenett, in the Sp. Pl. ed. 11.—C. C. B.

† It has no pappus.—C. C. B.

minori, Moris. [*Carduus leucographus*, Linn.], I take to be very different from the *Card. Mariæ hirs. maculatus* [*Silybum marianum*, Gaert.], growing so copiously about Clerkenwell, whose head is little inferior for bulk to the more common with milky veins.

Page 120. *Quær.* Whether the *Anagallis aquatic. major folio oblongo*, C. B. P. [*Veronica Anagallis*, Linn.], be not clearly omitted. As for the *Aquatica major foliis subrotundis* [*Veronia Beccabunga*, Linn.], perhaps it may be only a luxuriance of the *minor* under the same denomination.

Page 108. *Quær.* Whether the *Leucoïum luteum* [*Cheiranthus Cheiri*, Linn.], upon walls, be not a different plant from the *Leuc. vulgar. fl. simpl.* [*Cheiranthus Cheiri*, Linn.] growing in gardens. It seems to me to be much more woody, with larger flowers: the leaves glaucous, and extremely rigid or stiff, qualities not to be observed in the garden kind.

Page 133. I ever took the *Trifol. pumilum supin. flosc. long. alb.*, Phytol. Brit. [*Trifolium ornithopodioides*, Linn.], to be very applicable to the *Trif. siliquis ornithopodii nostras;* and perhaps the author of this name meant no other thing by it. The flowers are long, slender, and piped; they are of a most immaculate white (though your description seems to put them to the blush), and often with three on a stalk; which number of short and curved pods succeeding, does make out a pretty resemblance of a bird's claw; and I am fully persuaded the *Trifolium parvum album monspeliac. cum paucis floribus*, J. B.* is no other than this Bird's-foot Trefoil, which in my Catalogue I have made a synonyme for it. As for the *Trif. subterr. tricocc.*, whereunto you incline to apply the phytologist's title, it is true it has indeed the same sort of white fistulous flowers; but withal it has such a singularity in the mode of growing, as thrusting the stalks

* This name, and *T. pumilum supin. fl.* &c., a few lines back, are now referred to *T. subterraneum*, Linn., in common with *T. subterr. tricocc.*—C. C. B.

of its flowers, even while it is in flower, into the bosom of the earth, that I cannot but think this very peculiarity could not possibly have escaped the observation of its first explorers, who could not be so deficient in their way of imposing names, as to neglect such a remarkable note, so signal a characteristic in the composition of its title, as alone might serve to distinguish it from all the *Terræ filii* and Trefoils in the world. After this manner it was that the famous Dr. Magnol accommodated his name for it; so did Dr. Morison his, who indeed pretended to be the first discoverer of it, or at least assigned it to his princely patron, whose badge (*Gastonium*) was annexed unto its other titles in memory of its first invention, though I find it (yet still by names expressive of this peculiar) in authors before him, as in Vallot, Joncquet, and other catalogue writers, before that of the 'Garden of Blois,' by Morison, had any being in the world; so that I only hence infer that, had the authors of the 'Phyt. Brit.,' or the most learned J. Bauhine (but he saw not the growing plant), in their denominations intended the subterranean trefoil, they would not have contented themselves with lodging their discriminating character upon the flowers alone (that are intercommon with others of the same genus), but would certainly have taken along with them this wonderful property, which, while the plant was flowering, could hardly have evaded their notice; and therefore I presume they understood by those stated names no other than the *Trif. ornithopod. siliq.* [*T. ornithopodioides*, Linn.], which they might observe in flower, not heeding the pods; or perhaps finding the plant before it was podded, they were content to transmit such a diversity in its name as was derivative only from its flowers. Both these pretty trefoils grew in great abundance in Tothill Fields, by Westminster.

Page 145. The *Alsine tetrapetalos caryophylloides quibusdam Holost. minim.*, D. Rap. [*Mœnchia erecta*, Pers.], that grows frequently about London in upland pastures, is very different, in my opinion, from the *Alsine*

montan. capillac. folio C. B. P. [*Mœhringia muscosa*, Linn.], which indeed is a foreigner to us, but has a leaf as fine as a hair, and four white leaves to the flower, as the name imports, and is a pretty upright plant, of about a small span in stature, and not much unlike the *Alsin. tenuif. muscosa ejusd.* C. Bauh. [*M. muscosa* β, Linn.]

The *Auricula muris pulchro flore*, J. B. [*Cerastium arvense*, Linn.], omitted in the Synopsis, but inserted among the *Supplenda*, might perhaps have been supplied by the the *Alsine myosotis lanuginosa alpina grandiflora S. Auricula muris villosa flore amplo membranaceo*, D. Lhwyd [*C. latifolium*, Linn.], as being the same, or a variety of it.

Page 150. As for the *Sedum parvum acre flore luteo* [*Sedum acre*, Linn.], it is multisiliquous, or multicornous in its capsule, divided into five points, and when ripe makes a pretty resemblance of a star; and therefore, in my opinion, ought not to be disjoined from the *Sedums*, properly so called. Under this banner does the *Sedum minimum acre* march, and, if I mistake not, the *Minus teretifol. album* [*Sedum album*, Linn.]; but I have not yet thoroughly examined it, and therefore am not positive therein; nor can I say, without a peradventure, the like of the *Alpinum ericoides cæruleum*, G. B. P. [*Saxifraga oppositifolia*, Linn.]. Indeed your *Sedum min. Alpinum luteum nostras* [*Saxifraga aizoides*, Linn.] is, to the best of my memory, only bicornous, and is rightly disposed with the *Sedum Alp. trifid. folio*, C. B. P. [*Saxifraga hypnoides*, Linn.], which, in my Catalogue, goes under the name of *Sanicula aizoides tridactylites*; and for the better distinguishing it from the *Sedums*, I have made bold (and I hope not without your good leave) to alter your name, and prefix another to that elegant plant of your own happy discovery, which, with all its synonyma, I must submit to your approbation, viz. *Sanicula aizoid. Alp. fl. majuscul. lut. punctis croceis guttato. Sedum minus Alpinum luteum nostras*, D. Raii. *Sedum parvum montanum lut.* J. B. *Sedum Alpinum*

flore pallido, C. B. P., Park., and *fortè Sedum montanum Coris cæruleæ fol.*, Cat. H. R. P. [*Sax. aizoides*, Linn.]

Among other of our vegetable English rarities, I should think the *Sedum minus lato et crasso caule*, Cat. H. R. P. *Portlandicum Belgarum* might have deserved some place in your well-instructed Synopsis. I never was upon the island myself, but I have had it from very worthy persons that have seen it grow there. It is a vermiculate kind, but I could not learn that it ever flowered. Perhaps the grossness of its fascial stalk absorbs the nourishment that might otherwise have contributed to the production of its flowers.

The *Sedum Alpinum trifid. folio*, C. B. P. [*Sax. hypnoides*, Linn.], must be allowed the same with the *Sedis affinis trisulca Alpin. fl. albo*, J. B., and yet I have seen it in a dry season notably correspond both with the description and figure of the *Sedum Alpin. hispidum ferè spinosum* [*Sax. aspera*, Linn.] of the same author, and perhaps the same thing.

Page 151. The *Cotyledon hirsuta*, Ph. Br. [*Sax. stellaris*, Linn.], though to my own knowledge it be very different from the *Sedum minus*, Clus., yet methinks it bears a very favorable resemblance to the *Saniculæ Alpinæ aliquatenùs affinis*, J. B.

I must needs acknowledge that I am not a little entangled in my thoughts about the *Juncus parvus cum pericarpis rotundis*, J. B. [*Juncus compressus*, Linn.], which, though you are pleased to make the same with the *Gram. junc. marit.*, Lob., I cannot easily obtain with myself a compliance herein; but do rather accept it as the *Juncus acutus Cambro-Britannic.*, Park., and which I take to be a true and genuine Rush, as you most truly have observed. But unto this you are pleased to apply the *Junc. Cambrobr.*, Park. (h. e.), *Gr. junc. maritim.*, Lob., whose Icon of it (and indeed so do those of all other authors) agrees exactly with our Moss-rush, the capsules whereof are somewhat elongated and pinched in towards the top, resembling more a cone than

a globe, the capsules of the former being more accurately round, according as its name imports.

Page 213. I must here beg leave to excuse the celebrious Dr. Herman, who in 'Cat. Hort. Acad. Ludg.' with good reason separates the *Abies conis sursùm spectantibus S. mas*, C. B. P., *Taxifoliis* [*Pinus picea*, Linn.], from the *Abies alba S. fœm. ejusd.*, C. B. P. [*P. abies*, Linn.] And, indeed, this male-kind does in nothing differ, as I could observe from the short specimen (and it was all that he had) I received from that ingenious and worthy gentleman, Dr. Tancr. Robinson, who gathered it in some noted garden there, and brought it over into England, when with the present Marchioness of Winchester he last came out of Holland; I say, from what I could observe, it does nothing differ from the female but in the colour of its pectinated leaves, which in our pattern are green on both sides; in this, of a silver and gaudy hue underneath. And, perhaps, from this lovely gaiety of its silver colour, it might at first challenge to itself the annex of female, since men are generally apt to appropriate the most amiable and lovely, and indeed the most excellent of every kind, to the more elegant sex, as we see the more masculine arts and sciences are feminine in their names, and, by an universal suffrage, submitted to the dominion of the Muses.

Casting my eye upon your most curious index at the latter end, which is indeed of necessary use both as to the virtues of those plants contained in the Synopsis, as also in respect of those references you make from the less to their more proper denominations, I found in your account of the *Cannabis sativ.* the received opinion of an untoward faculty it has of emasculating mankind, and making impotent by extinguishing the fluid principles of generation, and which in some degree hath staggered your resolution what to determine about the *Bangüe indorum*. This, from the testimony of Olearius Acosta, and others, being of frequent use, both among Persians and Indians, to exstimulate and incite to venery, and therefore

very unlikely to be of the cannabine order. I confess I cannot determine how far it may conduce to this purpose, or the other to the contrary effect, but so much I know of the Bangüe (the seed whereof I have by me, and is very little differing from that of our hemp), that it will certainly cause a dementia, or frantic and ludicrous sort of madness, which runs the body into all the idle gesticulations and postures of the most lascivious, when in the mean time they are only the effects of present distemper, and not any lustful pruritations. And that nature is in distress, and under distemper, till the force and powers of the seed be dissipated and vanquished, will appear by this, that if you overdose your patient, it will certainly kill. I have known, where upon too liberal a dose, the effects have continued for almost a week, and had like to have put the poor soul to have sought for a Bethlem in another world. And why may not the *Cannabis* prove an incentive in the same unlucky sense, especially if that be true, as authors have alleged, that its seed, if freely taken, will induce an ἀφροσύνη, and, as Herodotus attests, a fumigation of the seed being cast upon hot coals, is said to affect the Scythians with raving and a sort of frenzy, that was attended with frightful ejaculations and howlings; so that they well enough agree in this particular. And it cannot surely but be allowed on all hands, that this Indian Bangüe is a true and genuine hemp, though in the mean time I must pronounce it specifically distinct from our European sort. I confess I was perfectly surprised to find Dr. Herman, in his 'Academic Catalogue,' so peremptorily assert it among the race of *Althæas*, and to promise the world an entire history of it under that head in his desired Musæum Ceylanicum, till calling to mind a mistake that had crept into the Garden of Chelsea, where, some time before the Catalogue came out, the *Sabdariffa Clus.* (which is no other than an Indian Alcea) was with mighty ostentation exposed to view for the *Bangüe indorum*. I presently bethought, that as that demonstrator had imposed upon Dr. Lister and other worthy gentle-

men here at home, so, holding at that time a correspondence in Holland, he might in all probability have transmitted the occasion for Dr. Herman's most palpable hallucination abroad.

June 3, 1690.

Mr. Lhwyd to Mr. Ray.

Honoured Sir,—The formed stones were very acceptable. The *Oculi serpentum* are, indeed, of the same kind with those they call Toadstones. The Cats-heads seem to me to be arches or joints of some *Cornu Hammonis*. *Baculi S. Pauli* are of the same substance with those stones that resemble the bristles of some American Echini, which, as I mentioned in my last, Dr. Plot has called *Lapides judaici;* nor is the Doctor much mistaken therein, for the real *Lapides judaici* seem to be nothing else but overgrown stones of this kind, as your large *Glossopetra* is amongst the rest of that sort; whereof I have seen one found in Sheppey much larger than that elegant one you sent me. When I say overgrown, I mean a large sort, or variety, much exceeding those of its family; which puts me in mind of a current report, how that in the county of Antrim, in Ireland, there are divers large pillars of star-stones able to support a church. How your bastions of St. Paul differ from our bristle-stones, you will best judge from some I shall send you. The vertebræ seem to be so indeed, and to have undergone but a small alteration. Those inscribed *Dentes serpentum* and *Ova*, I can say nothing to.

A Synopsis Method. of the Animals and Fossils of England would, doubtless, prove very instrumental to the advancement of natural history; and though a complete enumeration of those things would require much time, labour, expense, and travail, yet I doubt not but such a

catalogue as you could give us would be very grateful to the public, and prove a direction to several others to make farther observations of that kind, as well as your Catalogue of Plants has done. I question not but you may give us a great deal of information in the Catalogue of Insects, as well as you have done already in the Histories of Birds and Fish. I shall be very forward to give in my contribution, which will be some observations on Formed Stones and of the *Exanguia marina*. Dr. Plot will be likewise as ready.

We have performed our visit to Mr. Cole, and received abundant satisfaction in our journey. He received us, though all unknown to him, very friendly, and spent six hours in showing us his collection, without any interruption, or the least sign of being weary. It consists altogether of natural things, and seemed to us a very extraordinary collection for one person (and who, perhaps, had not the advantage of a liberal education to invite him to such studies) to be able to amass together.

We observed a Virginia animal of the cat-kind, seven foot and a half long, and another of the colour and bigness of our wild cats, which he told us was the common House-cat of Virginia; also a Skunk, which he rendered *Putorius virginianus*. This he told us would stink several miles, and sometimes so infect the air as to cause a pestilence. He showed us the horn of a Narhual, curiously wreathed, and about five feet long. A Danish gentleman told me he had seen a Narhual that had been taken by some Hamburghers at Groneland, an. 1684, having two very long horns, and that he suspected they generally have so, and that the Unicorns of them are but monsters. We also observed some of the *Cornea laminæ* of a whale, about three feet long and one broad, of a black colour. We have some at our Museum of a whitish colour, and about nine inches long; also the blade of a Sword-fish [*Xiphias gladius*], caught about Swansea, in Glamorganshire. He has several curious figured stones and shells, found in the west of England and in South Wales; very

elegant trees of the *Abrotanoides Planta Saxea Clusi*, with considerable variety of other Pori, Corals, Horny Sea Plants, &c. I admired a sort of *Cornu Ammonis*, found somewhere in Somersetshire, resembling a nautilus, but having two prominences each side of the aperture, about as thick and taper as the end of a walking-staff to be screwed in and out. Another Cornu, of a rainbow colour, about six inches diameter, and as thin as a shilling, composed of a sort of Selenitis or Talc. The resemblance of several exotic plants (as it should seem to me) in a kind of cole-slat, found somewhere near Bristow; they seemed to be of several capillaries, and one particularly like the *Capillus Ven. verus;* the signatures of the leaves as curiously veined as the real plants have. I have room to add no more at present.

Oxford, July 1, 1690.

Mr. LHWYD to Mr. RAY.

HONOURED SIR,—Considering your local words since I read your letter, I find some amongst the north-country words to bear affinity with the Welsh, both in sound and signification, which possibly may be some remains of the British tongue continued still in the mountainous parts of the north. Of these, if you please, I shall hereafter send you a catalogue; but in the mean time I must confess, that although they may agree in sound and sense, it will yet be difficult to distinguish whether they have been formerly borrowed from the Britons, or whether they are only an argument that the ancient British language had much affinity with those of Germany, Denmark, &c. I omit the supposition of the Welsh borrowing them from the English, in regard I find them not (at least but very few of them) used by the borderers of both nations; and the Britons might leave them in Westmoreland, Cumberland, &c., having heretofore lived there; but the

English of those parts could communicate nothing of their language to the Welsh, in regard they have never lived in Wales nor have bordered on them. Moreover, some of these words are in the 'Armorican Lexicon,' and the Britons that went to Armorica left this country before the Saxons came in.

The *Pectinites Amphiotis latiusculè sulcatus*, and the *Echinites rotularis minor angusticlavius*, with some others, are commonly found in beds of sand, which lie under the vein of stone at the bottom of the pits, though sometimes I have found the former in the stones by breaking them; but those usually of a different colour from the sand-shells. Whether they were ever the tegumenta of animals or are only primary productions of nature in imitation of them, I am constrained to leave in medio, and to confess I find in myself no sufficient ability or confidence to maintain either opinion, though I incline much to the latter. However it be, it seems an extraordinary delightful subject, and worthy the inquiry of the most judicious philosophers. On the one hand, it seems strange if these things are not shells petrified, whence it proceeds that we find such great variety of them so very like shells in shape and magnitude, and some of them in colour, weight, and consistence; and not only resemblances of sea shells should be found, but also of the bones and teeth of divers sea fish, and that we only find the resemblances of such bodies as are in their own nature of a stone-like substance. On the other hand, it seems as remarkable that we seldom or never find any resemblance of horns, teeth, or bones of land animals, or of birds, which might be apt to petrify, if we respect their consistence; insomuch that I suspect few formed stones are found (at leastwise in England), except in some extraordinary petrifying earth, but what a skillful naturalist may, and that perhaps deservedly, assimilate to some marine bodies; but yet when we confer them with those bodies they seem most to resemble, they appear generally but as mock-shells and counterfeit teeth, differing from them little less

than the works of art do from those of nature, which we endeavour to imitate, as if the earth in these productions (to speak vulgarly) should only ape the sea. To find out the truth of this question, nothing would conduce more than a very copious collection of shells, of the skeletons of fish, of corals, pori, &c., and of these supposed petrifications.

The figures of plants in the Cole-slat I have formerly mentioned to you, is clearly a different thing from the *Pictra Imboschata* of Imperatus. Indeed I have hitherto seen imperfect pieces of it; but whereas the *Pictra Imboschata* (of which kind of figures we have also some variety in England and Wales) represents only rude branches imitating rather some coralline or sea-moss than trees; the Cole-slat exhibits whole branches with leaves, and distinction of the veins and texture of them. I have a small piece which seems to resemble a branch of the *Filix fœm.* very much, but the specimen is very imperfect.

Mr. Bobart tells me the *Gymnocrithon* is the very same with the London *Triticum Spica hordei.* The *Alsine myos. lan. Alpina grandiflora* [*Cerastium latifolium*, Linn.] I do not question at present to be a distinct plant from the *Aur. muris pulchro fl. albo*, J. B. [*C. arvense*, Linn.], which is very common in these parts, but nowhere in North Wales (supposing this no mistake) that ever I could find. The plant I mean I never saw but at the highest part of all Snowdon: it is very woolly, but more especially before it comes to flower, which is extraordinary membranaceous, or thin; the calyx very long, crooked, and transparent, and divided at the top with many notches; the whole plant every way bigger than the *Auricula muris.* Since I sent you the collection of stones, I have discovered several new ones, whereof you may hereafter expect some farther account from, &c.

Oxford, Nov. 25, —90.

Mr. Ray to Dr. Robinson.

Sir,—The Essay you propound concerning the ancient and modern learning were not difficult to make; but I think you are better qualified for such an undertaking than I, and therefore shall refer it to you. In summe the ancients excel the moderns in nothing but acuteness of wit and elegancy of language in all their writings, in their poetry and oratory. As for painting and sculpture, and music and architecture, some of the moderns I think do equal, if not excel, the best of them, not in the theory only, but also in the practice of those arts; neither do we give place to them in politics or morality; but in natural history and experimental philosophy we far transcend them. In the purely mathematical sciences abstracted from matter, as geometry and arithmetic, we may vie with them; as also in history; but in astronomy, geography, and chronology, we excel them much. No wonder they should outstrip us in those arts which are conversant in polishing and adorning their language, because they bestowed all their time and pains in cultivating of them, and had but one, and that their native tongue to mind. But those arts are by wise men censured as far inferior to the study of things, words being but the pictures of things; and to be wholly occupied about them, is to fall in love with the picture and neglect the life; and oratory, which is the best of these arts, is but a kind of voluptuary one, like cookery, which sophisticates meats and cheats the palate, spoiling wholesome viands, and helping unwholesome.

Black Notley, Dec. 15, —90.

Mr. Ray to Dr. Robinson.

Sir,—Your last letter, of March 3d, expresses such excess of kindness, as one that did not well know you to be alien from all flattery or dissimulation would hardly think you wrote your own sense, especially seeing no merit of the object could induce you. I cannot but thank you for your great though undeserved (that I say not ill-placed) affection, which must needs enkindle an answerable flame of reciprocal love in the breast of any man that hath the least sense of gratitude or spark of good nature in him.

Of English Serpents, I never knew nor heard of above three kinds; and though one cannot be sure of a negative, yet I verily believe there are no more: those are,

1. *Natrix Torquata*, or the Snake, so called because it hath a pale yellow spot or streak on each side of its neck, though not encompassing it.

2. *Vipera*, or the Adder. I am well assured that Viper and Adder are two names of the same species, having taken exact notice of the viper beyond sea, and our adder at home. The differences between the Adder and the Snake are, that the former is much shorter for its bigness, especially his tail below the vent; that he is marked on the back with black lines or spots, which the snake wants; that his belly is blackish and of one colour, whereas the snake's is particoloured, of a pale yellow and blue. That the adder never grows to the bigness that I have seen some snakes attain to; and lastly, that the adder is viviparous, as I myself can testify, having taken seven young ones out of the belly of a female, come to their full perfection, as big almost as some women's little finger.

3. *Cæcilia*, the Blind-worm, or Slow-worm, which again are two names of the same sort of animal. It is much less than the adder, and streaked with blackish lines

along the body. All these kinds are plentifully in my own fields.

As for outlandish serpents, I saw but one kind beyond seas different from ours. Indeed I have such a natural abhorrency of that sort of animal, that I was not very inquisitive after them. That I saw was bought at Rome by Sir Philip Skippon, of a man that brought them about to sell: it was very gentle and innoxious, and I suppose the *Anguis Æsculapii;* but I described it not. After a while it escaped out of the box wherein we kept it, and hid itself that we could find it no more.

Besides these I have mentioned, I doubt not but there are divers species of European and African serpents; but know little of them of certainty which we may confide in but their names. Of the American serpents described by Piso, Marcgrave, and Hernandez we have more assurance, among which the Rattle-snake, whose exuviæ are common in museums, is most noted and best known.

Since my last, viewing the Mosses growing about my house, to see whether they were as yet come to the head, I found some of them were; of which I observed no less than four sorts of such as Dr. Plukenet and Mr. Doody call *Musci trichoides,* but herbarists generally *Adiantha,* or *Polytricha aurea,* two with erect heads, and three with reflex, besides one which was not come yet to the head; so that I have already discovered six species growing upon my own house.

Meeting yesterday with Mr. Dale, and examining him about serpents, he confidently affirmed to me that he had twice seen the *Amphisbæna* in this country, and named the places: not that there is any serpent that hath two heads, or a head at each end, but only that it hath a faculty of going backward as well as forward; and the tail is turrit, and somewhat resembles a head. I confess I did formerly distrust the very being of an *Amphisbæna,* but considering that worms, and some *Erucæ,* can and do move nimbly backward and forward, I see no reason but some serpents may do so too, and we have pretty

good authority that there are such. I was a little staggered at his assertion, but yet must suspend my belief till I have better assurance.

March 10, —90.

Dr. PLUKENETT to Mr. RAY.

SIR,—Your kind acceptance of my poor present is an addition to former favours, and I give my hearty thanks for the pains you took in the perusal of my Botanic Icons. I shall think mine the better bestowed on their production, in that you are pleased to give so great a character of them. I am only sorry anything of the desirable exactness, in reference to yourself, should escape my notice; for though I have industriously designed to avoid all exposing others mistakes, the omissions here are purely humane, and slips of frailty, without the least partiality or any sinister design of derogating from the felicity of your parts, or the honour that is due to the painful discoveries you have so freely communicated to the world.

1. Your first particular is an instance in the *Alsine Caryophyllloides tenuifol., &c.* [*Arenaria verna*, Linn.] of my Phytography, and its reference to that of the *Liniflore* in your general history. I confess I did make it a question of doubt, and the want of a closer application to yourself was the occasion of the misconjecture; and since it was only my doubt, which is not without a scope and latitude, that being always allowed to questions of this nature, though there be not an exact concurrence of every nice particular, it will I hope seem more tolerable, especially when I have so good an example as yourself to warrant me herein; for I observe, even in the very same plant, you are pleased by way of question to annex the *Auricula muris pulchro flore folio tenuissimè diviso*, J. B., as a proper synonyme thereto, which does as little answer it in the petala of its flowers as mine, and perhaps much less in its leaves.

2. Your second objection as to the *Asparag. aculeat.*, with its reference to your Sicilian sort, was but a bare suspicion, and may come under the same excuse.

3. The *Asarum è Terrâ Marianâ*, which I have since better referred as I conceive to another genus in Piso, together with the *Tulipifera caroliniensis*, which I refer to Hernandez, are indeed inserted in the appendix of your history, which, however they came to slip me, I know not, I own the failure, and acknowledge the obligation to have taken notice of them there; and yet to a person of your goodness and candour, the straitness of my letter-plates will make an excuse for the omission, with less difficulty obtainable.

4. The *Euphrasia lutea latifol.* and your *Cratæogon westmorlandic.* which you seem so much to dislike, were designed from the best dried patterns I had by me, which perhaps were not so perfect as I could wish; and yet I should be glad to see them better figured anywhere else; the shanks, indeed, of the flower of the latter might have been made a little longer.

5. The *Hippuris lacustris mansu arenosa* was designed from a dry specimen I had from Chiselhurst, where it grows abundantly; but the leaves, or dentals, are a little too long and sharp-pointed, which was a thing I complained of to my graver; but it seems it passed without amendment. As it is, it bears some likeness to your *Millefol. aquat. Equisetifolium*, but in a much nearer degree of resemblance (in my mind) to the *Equisetum fœtid. sub aquâ repens*, to which it is next akin.

6. As for the *Gramen spicâ laxâ pyramidali* I was positive herein, because Mr. Doody, who communicated the grass to you, communicated your name to me, and affixed it here. The *Gram. Phalaroid.*, I believe, may be your *Lusitanicum*, since mine was drawn from a dried specimen I long ago gathered in Mr. Morgan's garden, where, it seems, you had yours. The *Gram. Cyperoid. lanuginos.* was designed from the dried leaf, and rather less than so large as it is. Perhaps it was a plant of

the same kind, more than ordinarily luxuriant in its spikes.

7. As for the *Gram. Cyperoides elegans spicâ compositâ*, if there be any mistake herein, it must lie at Mr. Doody's door, for he it was, who with great assurance, appropriated your name to this very grass, and I think writ it with his own hand.

8. I am glad you tell me my *Lichen parvus erectus, &c.*, is not what you intended by the *Lichen minimus foliolis laciniatis*, it being by so much more my own; and yet you see how unwilling I was to make it so without your farther assurance. Indeed the source of most of these, my failures, was the aversion I had of multiplying species without apparent cause, or giving myself the credit of a discovery which perhaps was due to some other.

9. Your separating my *Melilotus luteus procumbens* from yours of *Messina* is truly instructive.

10. Your *Corymbifera Millefolii umbellâ* I thought must fall between the *Millefol. Tanaceti fol.*, Moris., and the *Ptarmica Alpin.*, Triumfetti. And therefore in my catalogue I put the doubtful *quære* to them both, especially since to the former I find an asterisk prefixed, denoting you had not then seen the plant, and therefore I could not peremptorily exclude it from a competitorship with that to which you have now assigned it, I confess that passage in your appendix had escaped me.

11. I could almost have sworn I had been right in the reference of my *Muscus Coralloides* to your name of *Muscus pennatus ramulis et capillament. falcatis*, it does so exactly answer that title, and therefore your monition here is extreme kind.

12. The *Salix long. fol. hirsuta rosea* I did not propose as a new species, but only as an accidental variety in the *Caprœa* kind, which I think has not anywhere else been exposed in Icon.

13. As to the *Lithosperm. maj.*, Dod., which is repent at the root, you would soon be convinced if you compare the other kinds with this, which was taken from a dried

specimen out of Mr. Charlton's collection, with the title affixed by Dr. Magnol, and which answers well enough to Thalius's name, it being very twiggy in its branches towards the top; but whether trailing on the ground or not I cannot determine, as never having seen it grow; perhaps mine may be only a single twig atop.

14. That the two *Astragaluses*, the *Stella leguminosa*, and my *Vicia Sesamacea Apula Fab.*, Column., are extremely differing by their collation, nothing can be more apparent; nor can your argument from Dr. Magnol make anything against it, since his, and our commonly received *Vicia Sesamac. Apula*, is no other than the *Securidaca siliquis foliaceis* of Monsieur Boccone, which has a variety with those affections you speak of, viz. the pods with foot-stalks almost an inch long. We may perceive Dr. Morison himself labouring under the same mistake, when in his 'History of Oxford' he proposes in Icon his *Astragalus annuus rectus flore ochroleuco*, which is no other than Boccon's *Securidaca;* for the *Vicia Apula*, Column., and that which is truly so (as everybody must own, both from the figure and description of Columna, in his 'Ecphras.' pp. 1, 301, 303), he sets down under the title of *Astragal. annuus siliq. et fol. hirsutis*, tab. 9, sect. ii, and makes it the same with *Fœnugræco sylvestri Tragi in quibusdam accedens*, J. B., as may be seen in his History, p. 109. And if ever my catalogue see light, these things will be better explained.

15. I thank you for your kind information about the Cambrian ferns; yet methinks I cannot but be steady to the title of *Filix pumila Myrrhidis facie*, it being a name that in few words so graphically denotes the thing itself.

16. The shrub that grew in Mr. Wilkinson's garden coming in some disguise, and in a different face from what I had from Carolina, had like indeed to have put upon me; but after it was graved I acquainted Dr. Robinson with my suspicions about it, and if you please to remind, you will find a note upon it amidst its synonyma; which, though it be put there only as a

variety, the hint may be sufficiently understood, as indeed I would have it; and it is the only double oversight (I think) committed in the whole work.

17. As for your suspicion of my misapplying synonyma to the *Alth. profundè serrato S. dentato folio*, J. B., it will be soon taken off, when I shall tell you that my opinion is, the *Thuringiaca Camerario ejusd.*, J. B., is the selfsame thing, though he seems to make them two, but with a great deal of vacillation and wavering. And now you will find Casp. Bauh. synonyma here used reconcilable enough to what it was intended, and Clusius's names will fall in pat, as you would have them.

18. If your *Ledum Alpinum hirsut. min. Cat. Exteror.* be my *Cistus Chamærhododendros, &c.*, it is very different from the *Cistus pumilis montis Baldi, &c.*, J. B., though this be a *Chamærhododendros* too, as being a monopetaloid, having but one leaf, with some top division in the flower.

19. My *Polygonum minus procumbens niveum Glaucis exiguæ fol.* is undoubtedly the *Polygala repens, nuperor*, Lob., and I believe the *Polygonum minus candicans supinum* of Dr. Magnol, though he upon mistake applies it to the *Paronychia hispanica*, Clus., which is a more surrect plant. And that the *Polygonum verticillatum*, J. B., is very diverse from this *Polygala* of Lobel, may be observed from the particular of its leaves towards the tops of the branches; for arriving within an inch and a half thereof, they leave the stalk well nigh naked for some space, and then, as it were to recover that loss, they grow to the very lip in a most close and imbricated order, which is never to be found in the *Polygonum verticillatum* kind. Something of this peculiar may be observed in Lobel's figure of it, though the interstice be not expressed. The *Polygon. minimum montanum niveum et sericeum*, Aldr., is no other than the *Paronych. Hisp.*, Clus., a false synonyme, and ill applied by Dr. Magnol to his supine sort, which I believe to be the same with mine.

20. I must confess it was not without some surprise upon me that you should condemn the collocation of my *Brassica spuria caule magis folioso* with the *Pilosella siliquata Thalii*, in that the stalk of mine is foliose, when the very *Pilosella siliquata* itself is not altogether destitute of leaves upon its stalk and branches, as the thing itself assures, and is so represented in the figure annexed to the *Hercynia* by the learned Camerarius. But were its stalks really viduate of leaves, and naked, I do not see why mine, arrayed with this ornament of leaves, should be shut out from a society with the other upon that account, any more than the *Bursa pastoris Alpina minor hirsuta loculo oblongo*, C. B. P., with its leafy stalk from the *Bursa pastoria minima verna loculis oblongis* J. B. Chabr., or the *Paronychia vulgaris*, Dod., both whereof (poor scabs) are Nudicaules; and yet I believe it were a hard matter to obtain your consent for a bill to divorce them upon the account of these inoffensive nuditics.

July 17, —92.

Mr. J. Aubrey to Mr. Ray.

Honoured Sir,—As to lime trees, I must advertise you that in Bedfordshire there are woods where are thousands of them, e. g. at Chicksands (Sir Osburn's), and in other woods thereabouts; also at Mr. Wyld's estate at Totham in Essex, and this I do assure you from my worthy friend Edm. Wyld, Esq., Mr. Bullock's kinsman. They also grow wild, but not so common in the Forest of Dean. In Cranborne Chace (Dorset) are very few, and they know not their name. As to Shaveweed used by artists (which they have from Holland), we have of the same sort, and as good, in a hill by B— Abbey, in Wilts. I do think there is a greater variety of Withys than you mention; a bencher of the Middle

Temple is very curious in them, but he prefers the red withy. King James II sent, by Sir —— Garden, to the Royal Society, a plant called Star of the Earth, with the receipt made of it to cure the biting of mad dogs, which is in 'Transact.,' No. 187. By the salt-pits at Lymington, Hampshire, grows a plant called Squatmore, of wonderful effect for bruises, not in any herbal. This I had from Th. Guidott, M.D., whose father had the salt-works, and is a witness of the cures done by it. My old friend, Mr. Fr. Potter (author of the Interpretation 666), told me that a neighbour of his who had the gout many years, an ancient man, was cured by an old woman with the leaf of the wild vine. I came there above a year after, and the party had never a touch of it. E. W., Esq., tells me of a woman in Bedfordshire who doth great cures for agues and fevers with meadsweet, to which she adds some green wheat. A Parliament captain (in Ireland) told me, when the army was sorely afflicted with the bloody flux, and past the skill of the doctors, they had a receipt from an Irishman, viz. to take the partition pith of a walnut and dry it, then to pulverize it, and drink as much as could be heaped on a 4d. or 6d., in wine, or, &c., and this cured the army. Sir Chr. Wren told me once (eating of strawberries) that if one that has a wound in the head eats them it is mortal.

London, Aug. 5, 1691.

Mr. J. Aubrey to Mr. Ray.

Sir,—When I was lately at Oxford I gave several things to the museum, which was lately robbed since I wrote to you. Among other things, my picture in miniature, by Mr. S. Cowper (which at an auction yields twenty guineas), and Archbishop Bancroft's, by Hillyard, the famous illuminer in Queen Elizabeth's time.

"For an head or eye
By Hillyard drawn,
Is worth an history
By a worse painter made."

I found among my papers this receipt for the king's evil, which I had from Dr. Stokes. Let the patient chew the roots of *Riperitis*, and it will make him spit, and bring away the malignity, and cure the distemper.

In another letter of Jan. 21, 169½, are these words, viz. "Mr. Lhwyd sent me a letter this week, acquainting me he hath received an ear of rye (but without any grain) taken out of a child's side of half a year old, under the short ribs, in Merionethshire."

London, Oct. 22, 1691.

Dr. Robinson to Mr. Ray.

Sir,—All our sea officers and understanding seamen agree that the Mediterranean sets out again into the Atlantic; and a gentleman who was employed many years in the mole of Tangier, brought back a chart with him of this ebbing out of the Strait's mouth; I own it is scarce reconcileable to the common notions of philosophy that there should be two contrary declivities or currents in the same channel; but the seamen have often laughed at my way of reasoning, telling me that the same thing is frequent in many straits, as the Hellespont and Bosphorus, but more notably in that of Negropont. I would not be thought to bias your better judgment, yet I must tell you that all the scholars about the town who read your book, do agree you to be under an error; indeed general opinions never determine me when I am inclined to think upon any subject (which happens seldom), and to speak the truth, I doubt of this; though Dr. Lister, Mr. Aston, Mr. Hally, Mr. Flamsted, &c., are all against you, so are all the seafaring men.

I told you there are many *Pectunculites* four and six times as large as any shell of that yet known; I speak of England.

The Nautilus shell in museums seems to me to be only the tail of the animal, and the diaphragms thereof the vertebræ; I know not how many volutæ the perfect shell itself may have.

Your opinion of cartilaginous fishes poising and raising themselves seems probable to me. I am not able to resolve you about those blood-vessels of vipers, serpents, and fishes, which you mention.

How do the cetaceous fishes raise and poise themselves? I think they spout water. How doth the Lamprey [*Petromyzon marinus*], the Mullus [Red Mullet], the Anchovy [*Engraulis encrasicholos*], the *Draco marinus* [the Great Weever], the Tunny [*Thynnus vulgaris*], the Drum Fish [*Tamburo*], the *Uranoscopus*, the Dolphin, the Centrina, the Skate, Torpedo, *Rana Piscatrix*, *Scorpius major*, the Bull Head [*Cottus gobio*], &c., which Signor Redi in a late book affirms to have no air- or swimming-bladder, raise and poise themselves?

London, Feb. 25, —94.

Mr. Lhwyd to Mr. Ray.

Honoured Sir,—The Holywell Moss seemed to me a variety (though perhaps it may be a distinct species) of the *Muscus Trichomanis facie, &c., Jungermanni.* The common people will not have it called *Mwswgl* [moss], but *Gwiribh;* which word is nowhere else used in any other signification than for a virgin. And here perhaps it may allude to the virgin St. Winifrid, and might have been formerly called *Gwâllt Gwiribh,* i. e. *Capillus virginis.* Georg. Agricola* says that the stones smelling

* De Nat. Foss., l. i. c. 5.

of violets acquire that smell from a moss adhering to them; but Wormius, in his 'Museum,' p. 38, says, a piece of one of those stones kept in his museum many years, having no moss adhering to it, did still retain that scent. I design to send for some of the moss and stone, when I have an opportunity, and then we may hope to be able to judge better of this phenomenon. I have sent to my correspondent to inquire farther about the truth of the relation of the ear of rye. Mr. John Aubrey writes to me, that he could give a guess how the ear might come in, but that it would not be fit to be inserted in a letter. In the same letter he acquaints me that a young Cornish gentleman assures him that he has lately observed in Catalonia, and amongst the Pyrenean Hills, many British words amongst the natives. I did not think that any young Cornish gentlemen had understood British; however, this wants a confirmation, and 'tis possible this gentleman having picked out five or six parallel words (which is easily done out of any language in these parts of Europe) took it for granted, from their guttural pronunciation, that there might be many more. "He* informs me that he was present when a stone was broken by workmen, which lay upon the top of the ground, wherein was contained a toad, in form and colour altogether resembling the common one, though something less, which, being laid upon the ground, crawled about as long as the sun shone warm upon it, but towards night died. I examined the stone (says he), and supposed it at first to be of an extraordinary open texture, or else the hole wherein the toad lay to have some private communication with the air; but upon a more strict inquiry I found the stone of a close grit, but that place especially where she lodged to be of a much harder texture, much of the nature of the iron stone which the workmen call an iron band."

Upon the reading your discourse of the rains continu-

* Dr. Richardson, of North Bierley, in Yorkshire.

ally washing away and carrying down earth from the mountains,* it puts me in mind of something pertinent thereto, which I have observed in the mountains of Caernarvonshire, viz. :

1. First, that generally the higher the hills are, the more steep are their precipices and declivities (I except the sea rocks), thus Moel y Wydhrha, y Grîb gôtch, and twenty others that might be named, reputed the highest hills in Wales, have the steepest rocks of any mountains I have seen; and that not only in their highest cliffs, but also in most of their other crags, till you descend to the lower valleys. This I can ascribe to nothing else but the rains and snow which fall on those great mountains, I think, in ten times the quantity they do on the lower hills and valleys.

2. I have observed a considerable quantity of the chips or parings (if I may so call them) of these cliffs to lie in vast heaps at the roots of them; and these are of several sorts and materials, being in some places covered with grass, and in others as bare as the sea shore; and those bare places do consist sometimes of gravel, and an innumerable number of rock fragments, from a pound weight to twenty, &c., and are sometimes composed of huge stones, from an hundred pound weight to several tons.

3. In the valleys of Lhanberys and Nant-Phrancon the people find it necessary to rid their grounds often of the stones which the mountain floods bring down; and yet notwithstanding this care they often lose considerable parcels of land.

4. I affirm, that by this means not only such mountains as consist of much earth and small stones, or of softer rocks, and such as are more easily dissoluble, are thus wasted, but also the hardest rocks in Wales; and they seem to be as weighty, and of as firm and close a texture as marble itself. It happened in the valley of

* Dissol. of the World, p. 44.

Nant-Phrancon, anno 1685, that part of a rock of one of the impendent cliffs, called yr Hysvaë, became so undermined (doubtless by the continual rains and subterraneous veins of water occasioned by them) that, losing its hold, it fell down in several pieces, and, in its passage down a steep and craggy cliff, dislodged thousands of other stones, whereof many were intercepted ere they came down to the valley, but as much came down as ruined a small piece of ground, and several stones were scattered at least 200 yards asunder. In this accident, one great stone, the biggest remaining piece of the broken rock, made such a trench in its descent as the small mountain rills commonly run in; and when it came down to the plain ground, it continued its passage through a small meadow and a considerable brook, and lodged itself on the other side it. From hence I gather, that all the other vast stones that lie in our mountainous valleys, have, by such accidents as this, fallen down; unless perhaps we may do better to refer the greatest part of them to the universal deluge. For, considering there are some thousands of them in these two valleys [of Lhanberys and Nant-Phrancon], whereof (for what I can learn) there are but two or three that have fallen in the memory of any man now living, in the ordinary course of nature we shall be compelled to allow the rest many thousands of years more than the age of the world. But I have been too tedious in things that are no information to you, for which I must beg your pardon, though I cannot forbear to add two other particulars which seemed very singular. First, at the highest parts of the Glyder, (a mountain about the height of Cader Idris), there are *prodigious heaps of stones*, many of them of the largeness of those of Stonehenge, but of all the irregular shapes imaginable, and they all lie in as much confusion as the ruins of a building can be supposed to do. Now I must confess I cannot well imagine how this has happened; for that ever they should be indeed the ruins of some edifice, I can by no means allow, in regard that most of

them are as irregular as those stones are that have fallen to the valleys; we must, then, allow them to be the skeleton of the hill exposed to open view by rains, snow, &c.; but then how came they to lie across each other in this confusion? some of them being of an oblong flat form, having their two ends e. g. E. and W., others laid athwart these, some of them laid flat, but many of them inclining, being supported by other stones at the one end, &c. I must confess I have seen nothing that appeared to me so strange as this in all those mountains. Had they been in a valley I had presently concluded they had fallen from the neighbouring rocks, but being on the very summit of the hill, they seem to me unaccountable. I know it might serve to confirm Dr. Burnet's hypothesis, but for my part, though I admire his learning and ingenuity, yet I must confess I cannot (as yet) reconcile his opinions either to Scripture or reason, though I have not seen either of those books that are written against him. The other observation is not so unaccountable as it is singular, and in some respects opposite to the former, viz. on the N. W. side of the same hill there is, amongst many others, one *naked precipice*, as steep as any I have seen; but so adorned with *numerous equidistant pillars*, and these again slightly crossed at certain joints, that should Dr. Burnet see it, I believe he would say it is one small pattern of the frame of the antediluvian earth. I must confess I admired it almost as much as he does (lib. i, c. 9) his precipice by the Mediterranean Sea, to which, after a long encomium, he says, *Vale Augusta sedes rege digna*, &c.; though I must grant that the shepherd, who was my guide, was far from wishing himself a mansion at this palace.

Oxford, Feb. 30, 1691.

Mr. Ray to Dr. Robinson.

Sir,—What you write of the Pectunculites found in England I grant to be true, in comparison with any Pectunculi commonly known; but there may be such species found in our seas which do not appear, but lie among rocks, or in great depths; and that this is not a mere subterfuge, and altogether *gratis dictum*, I will give you an instance of a testaceous fish—that is the *Echinus marinus*—three or four whereof Mr. Willughby and myself found, and took up alive in the sea, among the rocks between the Isle and Calf of Man, of that kind and bigness as I never heard before to have been found cast upon our shores, or drawn out of the sea by our fishermen. They were as big as both my fists. I have seen of them in Italy.

You must excuse me if I think the nautili shells, that are frequent in museums, are entire shells, and not broken pieces; for in such as I have seen there is no appearance of any fracture, and the enormous wideness of the mouth argues it not to be broken. And, besides, I myself have taken up on the shores of the Mediterranean small nautilus shells, of the striate kind, entire, which, for the shape and turn, were like to the common great nautilus shells.

How the cetaceous fishes raise, sink, and poise themselves in the water is, I think, clear enough, and the dolphin, you know, is of that kind; and for the other fish you mention out of Francisco Redi, the Centrina, Skate, and Torpedo, are cartilaginous. Of the rest I do not find mention in my notes of any swimming-bladder they had, excepting the Uranoscopus, which I do expressly say had a small one. Those fishes are farther to be examined. The Lamprey, I believe, cannot raise itself up in the water, and I doubt whether the Bull-head do or can.

As for the contrary currents at the Straits, if they be

at the same time, your argumentation must needs be good; and Mr. Smith, who was upon the spot, and on purpose to inquire and observe, acknowledges no such thing, but insists upon an under current; and as for the Thracian Bosphorus, he confidently affirms that the current constantly sets outward—I mean from the Euxine Sea. I am not concerned that the current (at the Straits, I mean) should constantly and only set inward, and it would suit my hypothesis better that it should be indifferent.

I have read over your Peyer's 'Merycologia,' and do own him to be an ingenious and careful writer; but yet in some few things I must needs differ from him, they being contrary to my opinions and observations, for I have, many years ago, with as much diligence as I could, examined the stomachs of kine.

I doubt whether Mr. Lewenhoeck's observations be exact; for in those of the seeds of plants I find him mistaken in some, v. g. radish, turnips, and others of that kind, which I have forty times dissected and opened with my hands, and seen clearly with my naked eyes. He saith they have four leaves, and figures them accordingly; whereas they have but two only, with a notch or crena at the top, but that not very deep, so as to make any show or appearance of two leaves. And it is clear, by their coming up, that they have but two leaves, for they bring up the very same that were inclosed in the seed. And Signor Malpighi agrees exactly with me, both in the number of leaves and the manner of their complication, both in his figures and descriptions.

B. N., March 3, —91.

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Mr. RAY to Dr. ROBINSON.

SIR,—Since my last to you, I find that our Fallow Deer is not the *Cervus palmatus* of Gesner, but, by the consent of Clusius, Bellonius, and Peyerus, the *Platyceros* of Pliny, lib. ii, c. 37, described by Bellonius, but in some particulars erroneously, v. g. with a long tail. It is vulgarly called Dama, but is not the Dama of the ancients. The French call it Dain, and the Germans Dam-hirsch; so that what the *Cervus palmatus* is I am yet to seek.

I am at some loss about the place of the *Camelopardalis*. I think there is good reason to place him among the *Ruminantia cornigera*, but whether he be of the *Cervinum* genus or no is questionable, seeing his horns are not ramose, as all the rest of that kind are.

In the year 1667, I saw in the Strand a strange animal (deer they called it), of which all the notes I took are these. It was near of a fox-colour, its body bigger than a goat, but of a like make; the horns black, not branched, once wreathed, not large; the ears long, and hanging down like a hound's. It had two wattles under the throat, such as are seen in some hogs. I saw it eat hay and barley, and it was very tame. If the horns of this creature were round, which I am in some doubt of, it is clear that it must be some species of Gazelle.

Your conjecture that Poor John is nothing else but the Hake [*Merlucius vulgaris*] salted and dried, seems to me very likely; but where they may be had I desire demonstrations.

I never very curiously observed Trouts [*Salmo fario*], because they do not often come in my way, there being none in the country near us. I believe I was thirty years of age before ever I saw one. Sprats [*Clupea sprattus*] I know to be nothing else but the young fry of Herrings [*Clupea harengus*] and Pilchards [*Clupea pilchardus*];

both which fishes come to their full growth in a year's time or less, and then breed. Upon this occasion I will communicate to you a particular which hath a long time perplexed me, and that is, whether all fish cast all their spawn at once (I mean in one year), or only part of it, retaining part for future *partuses*. That herrings cast all I am confident, finding none in shotten herrings. It is a principle with me that all animals have, from their very first formation, the eggs or seeds of all the young they shall ever bring forth, for when they are once exhausted and spent, the animal becomes effete. Now, a fish at every birth casting forth such an innumerable number of eggs as are contained in her whole roe, it seems strange there should remain seed-eggs enough, let them be never so small, as to suffice many years' births; and yet the whole mass of them together to be so little and inconsiderable, as not to be so much as taken notice of by any naturalist.

I find among my papers a short description I took of the skeleton of the elephant, in the Duke of Florence's museum, and therein this description of the bones of the feet. The toes of the fore feet, or rather the bones of the metacarpium are five; for it hath properly no toes at all, but only five ungulæ upon these five bones, which appear without side the skin. The like is said of the bones of the metatarsus, in the hind feet. It follows the ungulæ of these hinder feet are small, round, and blunt. So it seems this animal hath that peculiarity to have no toes in his feet. And it is doubtful whether his nails be ungulæ or ungues, they being round and blunt, and covering the very tops of his toes.

B. N., April 15, —92.

Dr. Hans Sloane to Mr. Ray.

Sir,—I have lately seen a collection of petrifications with Mr. Beaumont. Amongst the rest is the *Lapis astroites*, which is a sort of coral generated in the seas, between the tropics; and it seemed to be so clearly that, as nothing plainer. It is turned to flint, and the interstices between the starry pores are transparent. One of this kind he showed to me was half petrified, the other half remaining, like a common star-stone. He showed me likewise many impressions of several plants in slatt, as ferns, flags, &c. very fair and plain, with several stalks of plants petrified and inclosed in flint, which he talks of publishing, together with some figures of, and reasonings upon, them.

London, May 20, 1692.

Mr. Ray to Dr. Hans Sloane.

Black Notley, May 25, —92.

Sir,—Monday last I received your kind letter, attended with a rich present of sugar to my wife. They were both very grateful and acceptable; only the latter was too great and inadequate to any merit of mine to be received without some shame, as well the quality as quantity concurring to render it valuable. You have so highly pleased and obliged my wife, that she is much in commendation of your generosity, and returns you her humble service and hearty thanks, wishing that you were here to partake of some of the effects of your kindness.

I have been importunate with you to hasten the publication of your discoveries in the history of nature, as well for the advancement of real knowledge, and gratifi-

cation of the learned and inquisitive, as for your own deserved honour, that some other man might not prevent you, and by some means or other intercept what is yours. I am glad you make such progress, and cannot but approve your deliberation and circumspection; and agree with you that the clearing up of difficulties, and reconciling of authors, and reducing and settling the several histories and relations of species, will be a thing of eminent use, and of as much advantage to the reader as pains to the author.

The little plant you sent formerly you now conclude to be the *Callitriche Plinii* of Columna [*Callitriche verna* β, Linn.], and so it may be, I having never seen that. I find it overseen and omitted by me in my history; I suppose because, being seminiferous, I deferred it when I entered the *Lenticulæ* [*Lemna*, Linn.], thinking to put it in another place, and afterwards forgot it.

Those instances you would have added to my discourse concerning the wisdom of God I know are so considerable, that I am sorry my book wants them, which might have recommended it to the reader. If I had thought you would have been willing to spare time to peruse it, you should have had a sight of the copy before it had been committed to the press.

I am this morning sending away my discourses concerning the Primitive Chaos and Creation of the World, the General Deluge, and Future Conflagration, with additions for a second edition. If you please to revise and correct it before it be printed, I will order Mr. Smith to deliver the copy to you for that purpose.

Mr. Beaumont is a person that hath been very diligent in searching out and collecting, and curious in observing of, petrified shells and other bodies, and I suppose well qualified to write concerning them. I heard that he once threatened to write something in contradiction to Mr. Burnet's Theory of the Earth, which piece I could wish to see.

I am now upon a methodical synopsis of all British

animals, excepting insects, and it will be a general synopsis of quadrupeds. It will take me up more time to finish than I thought when I first set upon it; indeed so much as, if I had foreseen, I should hardly have been induced to undertake it; but now I must go on.

The remainder is, great thanks for your extraordinary kindness, attested by real effects, and profession of readiness to show myself grateful, if any occasion of serving you offers to,

Sir,

Your affectionate friend and servant,

JOHN RAY.

For Dr. Hans Sloane, at the
Duchess of Albemarle's, in Clerkenwell, London.

Mr. RAY to Dr. ROBINSON.

SIR,—I received yours of March 20, in an answer whereto I can only tell you as to the first particular, about *bisulc* and *quadrisulc*, that the reasons why I conjecture the Rhinoceros and Hippopotamus to be *quadrisulc* are (what I intimated before), the bigness and position of the outward hoofs, as they are represented in the sculps, not being set at that distance as they are in *bisulc* animals; and the authority of Columna as to the Hippopotamus, who (had the hind ungulæ been like to, and situate in like manner, as in other *bisulc* animals) would never have made such a remark upon it, viz. that its feet were *quadrisulc*.

As to the second, concerning the Viper, I believe that the eggs have no cohesion with the uterus, neither the young. I have easily turned the eggs out; and in the young, when ready for exclusion, I have indeed observed a navel string; but it seemed to be nothing but one single membrane, which served only as an infundibulum

for the yolk of the egg into the intestine of the young viper; just as I have seen in young Dog-fish [*Scyllium canicula*], in the belly of the old one, half, or a good part of the yolk hanging out of the body at the infundibulum. It seem to me not at all likely that creatures of the same genus should have a different manner of generation; and we see this hatching of eggs, properly so called, in the belly, exemplified in cartilaginous fish.

I have some reason to doubt of what you and Dr. Tyson write concerning adders having no vesiculæ seminales. A male that I dissected had a long vesicula replete with sperm (as I took it to be), like the milt of a fish, extending the whole length of the belly; but I did not carefully examine it, and therefore might be mistaken, and it might be nothing but fat.

B. N., June 1, —92.

Mr. Ray to Dr. Robinson.

Sir,—Our principal physician at Braintree, Mr. Allen, my acquaintance and friend, hath discovered hereabouts flying glowworms; and I doubt not but they are everywhere to be found, being nothing else but a kind of long-bodied beetle, though they shine not in this country. They answer exactly to Aldrovand's description of the *Cicindela volans* of Italy. The reason why I mention this is, because this gentleman meeting with this beetle, and finding by strict observation that the body of it answered exactly in figure to that of a creeping glowworm, suspected it to be the male glowworm; and having some creeping glowworms by him, put this animal into a box with one of them, which, after some short time, coupled with it; but because the box whereinto they were put was small and shut, to confirm the experiment, he put a creeping glowworm into an open

box, and a flying one to her, which, fluttering with his wings, did presently, in his sight, march to the creeping one, and couple with her. How this can accord with what Mr. Waller delivers of the winged *Cicindelæ*, that they are both male and female, and couple together, I see not, unless we say that there are two sorts of flying glowworms, the one sort having both sexes flying, and the other being the male of the creeping; for Dr. Plot's salvo will not here serve the turn, viz. that the animal in which Vintimiglia made the first experiment might be prurient with lust, and being shut up in a glass with creeping glowworms, might couple with them, as horses do with she-asses; for in our case the flying glowworm was not pampered, as wild creatures seldom are, nor withheld from those of his own kind for some time, and was at his free liberty in the box to take his flight away.

B. N., July 8, —92.

Mr. Lhwyd to Mr. Ray.

Honoured Sir,—When your last letter came I was at London about a legacy of books, medals, and pictures, bequeathed by Mr. Ashmole to the University, since which time I have been so continually employed in taking a catalogue of them, that I have had but small leisure to go abroad to make any discoveries.

My discoveries in formed stones of late are but few. I have a stone almost a foot long (but broken in several pieces), something of the colour, shape, and politeness of a rhinoceros's horn, which, perhaps, is congenerous with that they call *Unicornu fossile;* and have also found at Witney and Charlton, in Oxfordshire, and Farringdon, in Berkshire, several very odd petrified bones, to me at present unaccountable, and like to continue so, at leastwise a long time. At present I only suspect them to be

the bones of some marine creatures. It is certain they differ totally from the bones of any land animals at present in the island; and we have no reason to imagine that this country was possessed anciently of any other land animals than what it is at present, unless we should give way to Dr. Burnet's hypothesis, or some such other invention. I have also two fossils, which seem to be fragments of fish-jaws petrified, each of them having their teeth (to wit, toad-stones, or the *Occhiedi serpi* of the Maltese) placed in their natural order, as they are in the *Lupus*, and probably in some other fish. I have likewise discovered very elegant stones of those kinds which I have called *Siliquastrum* and *Punctularia*. As for the *Cornua Hammonis*, I am now satisfied they are all of the nautilus kind, and of such like shells; but, as you say, what is become of all these species, if they are petrified shells? I say they are all of the nautilus kind, not that any of them scarce resemble the known species of *Nautili* (for such as do have been called by Calceolarius and Morcardo *Nautili*, &c., and not *Cornua Hammonis*), but because they consist of several articulations, which is a structure agrees with no other shells but the *Nautili*. The sutures upon them, which Boccone and others compare to oak-leaves, are nothing else but the commissures of the joints, and these joints nothing else but the spar, or other stone, filling the cavities of the cells in the nautilus; and this I conclude from one or two specimens I have found, which have the shell still remaining in the interstices of the joints. That figure of the joints which I compared to vertebræ is acquired from the shape of the septum, or partition in the shell. I think Olaus Wormius was the first that compared any *Cornua Hammonis* to a nautilus.

Oxford, October 7, —92.

Capt. HATTON to Mr. RAY.

SIR,—Those few plants of Rauwolfius's collection, published in the Appendix to the 'Historia Lugdunensis,' got him so great fame amongst the lovers of botany, that I have heard Isaac Vossius declare above £400 sterling had been offered for the four specious volumes he had of dried plants collected by Rauwolfius; and to most strangers who came to see his deservedly-famed library, he constantly showed those amongst his other most valuable books; and very few books writ in any modern language are mentioned with a higher encomium than Rauwolfius's 'Itinerary' is; but being printed about a hundred years since, it is very rare, and being never translated out of High Dutch (in which language it was writ), it is unintelligible to those who do not understand the German tongue, which occasioned me, some time since, in discourse with our learned and ingenious friends, Dr. Sloane and Dr. Robinson, to express my sentiments, that I believed a translation of it into English would be very acceptable to all the ingenious persons of our nation; and they both concurring in my opinion, Dr. Sloane borrowed it out of the library of the Royal Society, and Mr. Staphorst is about the translation of it into English, and hath near finished it. But before it be published, it would be very necessary not only that the style of the translation (which is performed by a German) should be corrected by a master of the English language, but that the author himself should be animadverted on in some places. The learned and famed Ludolphus, in his incomparable Commentary on his 'Ethiopic History,' hath reproved him for asserting that the Unicorn was in the Abyssin's country; but Rauwolfius doth not pretend to have been there, only relates it from one, his affection to whom had biassed his judgment; and it is much to be feared that even the perspicacious and judicious Ludolphus himself may have been imposed upon in some things he

asserts by the credibility he gives to the relator; and considering that, since the time Rauwolfius travelled into Asia, the manners and customs of those countries may have been altered and changed, and some have been more fully discovered than he could in his short stay in those parts. It was highly to be wished that some person, duly qualified for such an undertaking, would, where requisite, make some brief animadversions and dilucidations; and if any person of great and deserved fame would, in a short preface, give some account of the author (whose life is not, as I know, related by any person but Melchior Adamus, and that with his wonted brevity), and by a favorable character of the work, give it a recommendation, it would be an invitation to all ingenious persons to peruse it, for which achievement there is no person on earth so duly qualified as the justly-renowned Ray. Therefore, pardon me, sir, if I join my humble desires to those of our afore-mentioned worthy friends, that you would please to give a new life to Rauwolfius, put him into a fit garb and dress to appear in, and by your passport and recommendation, make his converse not only acceptable, but desirable, to all the ingenious men of our nation; which, if you will please so far to condescend as to perform, Mr. Smith engages to return you, in a fitting manner, his thanks for the benefit he shall receive by the book, being thereby rendered much more vendible; and all persons of learning or ingenuity will, I doubt not, acknowledge it as an obligation from you to them.

Whilst I am now writing, a Westmoreland acquaintance of mine coming to see me, in discourse did accidentally mind me of the surprise I was in, some years since, at Lowther Hall, in Cumberland, the house of Sir John Lowther. Seeing at Sir John's table a fresh-water trout, which was thirty-eight inches in length, and twenty-seven in girth, taken in Ulleswater, a large lake in Westmorcland, in which, I was assured by Sir John and other persons of unquestionable credit, trouts of that size

(nay, larger) are frequently taken, I thought fit to mention this to you, not knowing whether you have seen or heard of these trouts, or any other of that bigness, commonly taken in England. I am, sir, to yourself, lady, and family, with all due honour and regard, &c.

October 25, 1692.

Mr. AUBREY to Mr. RAY.

London, December 15, 1692.

SIR,—There are Water Blackbirds [*Cinclus aquaticus*] about Rentcomb in Cotswald, which I never heard of before, &c. Mr. Gibson, of Queen's College, Oxon, of Westmoreland, saith, that in Westmoreland, eagles do breed in Willow-Cragg in the parish of Bampton.

I remember the saltpetre men told me heretofore, that in ground abounding with saltpetre they find a little yellow insect, as yellow as gold, which is a good indication to them for saltpetre. In Mr. Wyld's woods, at Totham, in Essex, an eagle was killed about eight years since, whose wings extended nine feet long. Mr. Wyld has one of the feathers.

Mr. LHWYD to Mr. RAY.

SIR,—The account you have been pleased to give me of your Tract concerning the Dissolution of the World, makes me think it very long till I see it. Your discourse of Formed Stones comes in very opportunely, and indeed must necessarily affect the reader with its novelty and clearness of argument.

As to the fossil oysters, and my other observations of late in this kind, they do, I must confess, confirm me in my apostacy; for I have been inclined to a misbelief of their being mineral forms, ever since I found the first

Ichthyospondylus, viz. above a year since. If I had abilities of travelling one or two summers, I believe I could make this matter clear enough, and beyond dispute.

I have also an ear of rye out of Dolgelhe parish, Meiryonydhshire, that was taken out of the side of an infant. The truth whereof is so well attested, that as yet I fully believe it. When the child was born, he had a protuberance on the left side under the ribs, about the bigness of a small nut; all the sustenance given him for six weeks he vomited, and did not thrive at all: about which time the knob broke; and the mother surprised at some odd thing she saw therein, called to her husband, who observing the straw end to peep in and out, as the child cried, or was quiet, he held it between his nails, and plucked out this ear. The mother applied a plantain leaf to the sore, and it was well in twenty-four hours. Your opinion how it came there would be acceptable. My Lord of Bangor has sent to me to desire your opinion of the Holywell moss, as to its sweet scent. It is very true that it smells sweet (as I myself experienced anno -88) at the very place. Whence it acquires its scent is the question: my lord thinks it sweetened by art; but then he knows not perhaps that it has that smell in its native place.

Oxford, Dec. 20, —92.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Jan. 31, —93.

SIR,—This morning I have sent back the box you were pleased to send me, containing the papers of fishes, and Mr. Sherard's dried plants; and should have given you by letter more timely advice, but that I was not sure I should finish them so soon. You will find in the box a letter to Mr. Sherard, and another to Mr. Smith the

bookseller; which, indeed, is nothing but a catalogue of exotic plants drawn out of Mr. Sherard's papers.

I have set down some of my conjectures concerning some of the species of fishes, which I offer to your consideration. There are two draughts upon the same paper without names, of fishes which I suppose want the inferior pair of fins, but I would willingly be further assured thereof from yourself, and whether they be known to the seamen by any names.

I cannot but admire your industry and diligence in collecting and describing so many species in so short a time, not only of plants, but also of animals; and I hope you will so soon as may be gratify and oblige the curious in publishing of your labours. The copy of my Synopsis is so intricate and perplexed by references already, that I thought not fit to confound the compositors with more, and have therefore put a great number of the fishes, which I had not room to enter in their places in the body of my work, together by themselves at the end of it; by which means the author of the descriptions will be more taken notice of, than if they had been scattered and dispersed singly through the body of the book.

I give you hearty thanks for your great kindness in wishing me health. I thank God I am well, saving the sores upon my leg, which, according to the weather, are more easy or troublesome; in general, they stand much at a stay: and my wife salutes you with her humble service.

I shall be very glad to have a sight of your descriptions and figures of birds.

I am, Sir,

Your very affectionate friend and humble servant,

JOHN RAY.

Dr. Hans Sloane to Mr. Ray.

London, Feb. 16, 169¾.

Sir,—I should have some time since given you my thanks for the favour you did me in sending me one of your books of Physico-Theological Discourses; which I now do, assuring you at the same time, that you have me very much at your command and service. I have perused most part of Rauwolff's Voyage; which being only extant in High Dutch, and that understood by very few, I thought would do well in English, and so borrowed it from the Royal Society: and Capt. Hatton being desirous of it likewise, we put it into the hands of Mr. Staphorst, who has done it as you see, I think pretty clear; though the making it good language, and the notes, are left wholly to you. Some passages are not to be well translated, because of differing customs and proverbs; but I think so far as the natural history is concerned it may be understood. Authors make mention of a fourth part of this work printed the next year, viz. in 1583, which is very true; for some of the plants of Rauwolff mentioned by him, and described in this journal, were engraven in wood, and without any farther descriptions, only references in the margin to the descriptions in the pages of the journal, make up a fourth book, or part; which, with a new title-page, was what made the second edition; the book in pages, &c., without cuts, and of the first edition in 1582, being exactly the same as with the fourth part, and cuts, in 1583. The compiler of the Historia Lugdunensis at the latter end, in an Appendix, takes all these cuts, bating some few, which had been graved in the body of that history; and adding the descriptions out of the journal to the cuts, makes that Appendix which we have at the latter end of that work. I think this work a very curious one in several natural remarks, as in the spiral cutting of the poppy-heads, in making opium, &c. I have likewise solicited hard to get one Martin's book of Greenland trans-

lated and printed. It was done into order from his mouth by Martin Fogelius of Hamburgh, and there printed 1673 in 4to, with many cuts of birds, plants, &c., of those parts, and is not extant that I hear of in any language but High Dutch. I have seen two plants from the Cape of Good Hope; they are both coniferous trees, and one has a seed pappous, or rather feathered, like the seeds of Viorna; but with those seeds of feathers sticking between the scales, it makes one of the loveliest cones I ever beheld, if you add that the leaves are covered with the longest, whitest, and thickest tomentum I ever saw, being else like to the leaves of a willow. The other cone has its seed in the middle, and not between the scales, but at top of the cone together, and is also feathered.

Mr. Ray to Dr. Hans Sloane.

Sir,—I received all your letters, and Monday last the box containing your draughts and descriptions of birds, which I have perused, but shall make no remarks upon till I receive the Synonyma you mentioned, that I may see how far we both jump and accord therein. I perceive there are several species of water-fowl, both of such as swim, and such as haunt and frequent watery places common to Europe and America. I cannot again but admire your industry in collecting so great a number of species in so short a time, and not only collecting, but so exactly observing and describing them. I return you hearty thanks for your kind offer of the Catalogue of your Jamaica plants; but think not fit to accept it, for two reasons: first, because in these Catalogues I now publish, I meddle not with American and Indian plants, but secondly, and principally lest I should deflower your work, and in any measure prejudice the sale of it. Else such a Catalogue would be the greatest ornament and jewel I could add to set forth my book, and recommend it to the

reader, and make it current all over Europe. My wife sends you her very humble service, and I am,

Sir,

Yours entirely to command and use,

JOHN RAY.

Black Notley, Feb. 28, —93.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, April 10, —93.

SIR,—I ought long since to have acknowledged the receipt of, and returned something in answer to, your friendly letter of Feb. 16, 1692, but truly I have been ever since so afflicted with constant pain by reason of exulcerated pernios of both my legs, that I have had little heart to write or to do anything else but what was necessary. I am now, I thank God, at a little more ease, and do hope warm weather coming on will dry up and heal my sores. You need not have taken any notice of my book; an hundred of them will scarce suffice to acquit me of the obligations you have laid upon me by your many favours and kindnesses.

You have done well in procuring Rauwolff's 'Itinerary' to be translated and published in English. I wonder, indeed, so good a book hath lyen so long locked up in High Dutch. The translator hath done his part as well as could be expected from a foreigner; I have revised it, and altered the phrase and language, where I thought it less grammatical, or consonant to the idiom of the English tongue, or to the words approved now by use among the learned and civil part of the nation. Annotations (either parallel or additional out of other writers, or corrective or significative of the partial alterations of customs and manners since Rauwolff's time, which, as Captain Hatton suggested to me well, must in all likelihood have happened in the space of above an hundred years) I have

had no leisure to add, but have referred that back to Mr. Robinson, who I hope will perform it well. A catalogue of more rare Oriental plants, growing in those parts where Rauwolff travelled, I have drawn up, to be added to the end of the work, referring such as are found therein to the page where they are mentioned or described.

I have formerly drawn up and published a Catalogue of such plants, not native of England as I myself found growing spontaneously in my travels beyond sea, to which I have added what escaped my notice, out of Mangol's Catalogue and Appendix of Montpellier plants, M. Hofman's Cat. of Alterfine, C. Bauhine's, of Basilian, Commeline's Holland Catal., P. Beccone's Sicilian Plants; moreover, all Clusius's Pannonic plants, and all the Helvetic and Rhætic, besides, mentioned and described in C. Bauhine's 'Prodromus.' These are all put in one alphabetic catalogue, wherein I have still room left to receive what you shall please to contribute, or procure from Mr. Sherard: for this book will not be printed before September next, my bookseller having his hands so full that he cannot attend it.

The work you mention of Martin's, &c., must needs be a curious piece, if well done, and deserves to be translated and published. If well done, I say; for if Martin did not take notes from the plants and animals lying before him, but dictated to Fogelius from his memory, his descriptions cannot be exact.

The two trees you mention from the Cape of Good Hope are very curious, singular, and extraordinary.

I am sorry my book wanted the advantage your memoirs and figures would have given it, in reference to the earthquake at Jamaica. But my description and notes concerning it were huddled up in haste (the press stopping all that while), and sent up to London in loose papers, as you may perceive by the confusedness of them; and truly you did not then come into my mind, else I should have made them stay a little longer, till I had written to you concerning it.

If ever the book come to another impression, they may then be added to it. My wife returns you her very humble service by the hand of,

Sir,

Yours in all offices of love and service,

JOHN RAY.

I am glad you have brought your Jamaica work so near to a period, and long to see it in print,

To Dr. Hans Sloane, at the
Lord Montague's House,
in Clerkenwell, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, October 16, —93.

SIR,—I received your friendly letter last post. I should be ungrateful should I not take notice of and acknowledge your great kindness in being so solicitous for my ease and relief. But truly my ulcers are *mali moris*, such as have hitherto resisted and frustrated all means and methods of cure; and I fear this last of mercury will prove unsuccessful: for since my letter to Dr. Briggs, I took another dose of calomelanos, and that a very moderate one, of no more than x gr., and I am confident well prepared, being done by our physician himself. But yet this had the same effect upon me as the former, keeping me waking all the latter part of the night, and withal casting me into a sweat (which might happen by reason of the warmth of the weather). The next day it purged me pretty much, not ceasing to work till night. The day following it put me into a feverish heat, which went off the next morning in a sweat; then I thought it had done, but on the eighth, ninth, and tenth days it purged me again, but very moderately, and I know not whether it be yet quite out of my body. During all this time I

find no remission of pain or abatement of the running of my sores. Yesterday I, by the advice of Dr. Robinson, applied the emplastrum, and *ranis cum mercurio*, which is so far from giving any present ease, that it aggravates the pain, especially in the night, so that my rest was much interrupted by it. What good it may do for the future I know not, but in other plasters that I have used at first they have been most easy, and afterwards more troublesome and afflictive; only this which I have used all this summer and part of the spring gave me present ease the first night I applied it, and so hath done ever since, my ulcers never disturbing or interrupting my rest, which they did very much before.

I have this summer made use of a decoction of sassafras sarsa, and china with some sage and hypericon, and shavings of hartshorn, but without guaiacum, for a short time: I found that it heated and dried my body, but gave me no sensible relief, so I gave it over because it was nauseous and ungrateful to my stomach; but upon your recommendation I will make another trial of it.

I thank you for your kindness in expressing so great a readiness to comply with my desires in communicating your undescribed birds and fishes of Jamaica, towards the perfecting of my Synopses of those genera. I shall desire (they being new things) the entire description of them. They will be the greatest ornament of my book, there being nothing besides new in it. Indeed I undertook it only at the instance of my bookseller, and to gratify him, not without some regret. It will be of little use to those who have Mr. Willughby's Ornithology and Ichthyology. I have the copy of this book ready for the press, wanting only your contributions: I suppose it cannot yet be printed for want of paper.

I cannot but wonder at the relation you sent of the effect of *Cynocrambe*. I never read or heard of any such noxious or deleterious quality in it, yet possibly there may be, for I doubt much whether any of our herbarists ever made trial of it. I believe what they have

of the virtues of it they took out of Dioscorides, whose *Cynocrambe* is another thing.*

I intend this week to remit Martens's Spitzberg voyage. When I say I have nothing new in my Synopses, I mean by new not published in print, for else I have some species of birds and fishes taken out of Martens, and some others out of Hernander, which are not in the histories I mentioned of Mr. Willughby. I should be glad to see anything of yours published in print, for I know it will answer the opinion I have of it. My wife tenders her humble service to you by the hand of,

Sir,

Your affectionate friend and humble servant,

JOHN RAY.

This letter should have been sent last post, but that the postboy neglected to call as he passed by; since which time, upon applying a new plaster of that *è ranis*, I found my leg so painful all day, that I was afraid to continue it on all night, so I took it off, and applied my usual plaster: after which, going to bed, I rested about three hours, and then waking found a great disturbance in my belly, so that I was forced to rise. Afterwards I could not sleep till daylight. The day following (which was yesterday) I was more at ease than I have been a great while, feeling no pain at all: yet in the night, after my first sleep, the pain returned and continued as before, but yet during the remission of the pain the sores ceased not to run as before. I am apt to think that the mercury in the plaster might affect and work upon my body, for I find still a working in my belly, so that I believe I am not yet quite clear of it.

For his honoured friend,
Dr. Hans Sloane, at
Montague House, London.

* The Cynocrambe of the herbalists is *Mercurialis perennis*, Linn.; that of Dioscorides is *Theligonum Cynocrambe*, Linn.—C. C. B.

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Mr. RAY to Dr. HANS SLOANE.

Black Notley, November 1, —93.

SIR,—I received yours of October 21, and that of the 28th of the same month by post; and the woods and roots you were pleased to send me by carrier on Monday last, for which being not able to make you any amends, all that I can do at present is to return you many thanks. I intend speedily to observe your directions in making use of them. Lime-water I have made use of outwardly to wash the sores the greatest part of last summer, and have received some benefit by it, but not so much as to heal and dry them up. I have lately applied a plaster in form of a cerecloth, which I had from a neighbour, who knew not the ingredients of it; but, by the scent and consistency of it, I plainly perceive that there is Burgundy-pitch and rosin in it, which at first agreed marvellous well with the ulcers (as all plasters I have used did best at first), so that had the weather favoured, I was in some hopes it might have healed them up; but it happening lately to be cold and frosty, they fell off itching and spread again, and are now come to be as bad as before. I observe, that let me keep them never so constantly warm, yet frosty weather will affect them, and cause such a pruritus as in chilblains we experience.

I have myself lately received a letter from Mr. Smith, whereby I understand that he designs not to begin to print my Synopses till Christmas next; it may be not till Lady-day; and then I dare say, if committed to Mr. Mott, they will be half a year in hand: howbeit I would willing, now the copy is finished, rid my thoughts of it, and therefore am ready and desirous to receive your contributions so soon as may stand with your convenience. I am not yet in such haste as to intrench upon your more urgent occasions, or to incommode you in any kind, being, you see, at liberty to await your leisure, if it be

half a year or more. My wife tenders her humble service to you by the hand of,

Sir,

Your affectionate friend and servant,

JOHN RAY.

I needed not have given you the trouble of this letter, because Mr. Dale being in town can fully inform you of my present condition and affairs, but only to acquaint you with the receipt of the parcel.

For his honoured friend,
Dr. Hans Sloane, at
Montague House, London,

Mr. RAY to Dr. HANS SLOANE.

Black Notley, November 29, —93.

SIR,—Your continued kindness and solicitousness for my ease and relief exacts no less from me than a grateful acknowledgment. I have for some time made use of a diet drink, made by decoction of those materials you were pleased to send me, the effect whereof is scarce any discernible diaphoresis, but a manifest diuresis, it causing a great defluxion of urine. I think for the present, while I am taking it, it doth somewhat abate the running of the sores (which yet after a day or two's intermission returns as copious as before), but makes them more painful. Yet is not the pain so great in the night-time as to cause any disturbance or interruption of rest, nor indeed hath it ever been since I first applied the plaster I still use: so that to mitigate pain or procure sleep I need not the assistance of any opiate. One inconvenience I find by the use of this drink, that it keeps me waking, and much diminishes my rest, whether by drying the brain or some other unknown virtue. But to return to my sores. I have now, I think, upon good ground reassumed my former opinion, that they are nothing else

but ill-natured kybes or exulcerated chilblains called pernios. My reason is, because cold, but especially frosty weather, affects them much, causing such a troublesome itching as we experience in chilblains; and further, they spread with little hard tumours or knots within the skin, and this though I keep them constantly warm. Hence I infer that the cause of them is not so much the chilling of the parts affected by the external cold, to which they are exposed, as the congelative particles (whether nitrous or of what nature I know not) with which the air is charged, drawn in by the mouth in breathing, and in the lungs communicated to the blood. You will demand, why then are these tumours excited only in the hands and the feet? I answer, that the external cold doth indeed concur to the generation of them: for the hands and feet being the extreme parts of the body and of small bulk, and most distant from the fountain of heat, the heart, the blood by that it arrives there loses much of its heat; and so these particles being by reason of their gravity, unapt to comply with the motion of the blood, it lets fall many of them (as we see warm water will sustain much more salt than cold; and as the heat diminishes lets it fall by degrees), which resting there, cause these tumours so troublesome with their itching when they are externally heated. In persons young and vigorous, who abound in natural heat, and in whom the blood is maintained in a brisk motion, if these parts be kept constantly warm there are no chilblains generated, the blood retaining these congelating particles, which are easily supported in it, and whirled about with it, till they be gradually cast off and evacuated by the natural connectories. But in persons aged, in whom the motion of the blood is languid, when it is sated with them, a little diminution of heat, which must needs follow from * *

* * * * * * *

[per]suaded and confirmed in my opinion of the nature of these ulcers by the ineffectualness of all the physic I have used toward the healing and drying them up; and

I do believe, had not the last spring been so unusually and unnaturally cold, they would have healed of themselves before summer was ended. But that also succeeding not very warm after a cold spring, there was not heat enough to do it in one of my age. And this I rather think, because those on one of my legs did heal and dry up at last, though long first, and not till the very end of the summer.

You need not make more haste with what you please to contribute to my work of fishes and birds, of your own observation in Jamaica, than will well consist with your other occasions; for, by Mr. Motte's proceedings with my Catalogues, I believe that book will not come on this twelvemonth yet.

Dr. Robinson tells me of one Father Plumier, who hath published at Paris two folios of West India Plants; it is like he may have anticipated some of your discovery. I shall add no more at present but my wife's service, and that I am, Sir,

Your very affectionate and obliged friend and humble servant,

Jo. Ray.

The carrier brought me nothing from Mr. Churchill.

Mr. Lhwyd to Mr. Ray.

Sir,—I observed near Kidwelly, in Carmarthenshire, this last summer, that the *Gryllo Talpæ* live there in the sea-lands that are covered every tide. I brought one of them with me, and cannot find that they differ from those of the midland counties. In Wales they are called Rhing y Lês., q. d. *Stridor æstivitatis.* I am, &c.

Oxford, Dec. 12, 1693.

The Reverend Mr. PASCHAL to Mr. RAY.

SIR,—There seems to be throughout the universe a mutual contranitency between parts central and circumferential; those emitting and propelling outwards; these resisting and repelling inwards. Of this I have three instances now in my thoughts.

1. In this, or any other planetary system the sun sends forth, chiefly by its ecliptic parts; and the ambient fixed stars in their respective ethers, and according to their powers, give bounds, and beat back, from whence proceeds a plenitude as absolute and entire, and close, as the nature of such a fluid can admit of.

2. In this, or any other planet, the internal solar matter inclosed in its cortex, moving rapidly about its own axis, continually steams out most directly and vigorously in the equinoctial parts; and the encompassing ether is always, according to its power, giving limits to those steams and driving them back.

3. In all those particular mixed bodies, made so as to send outward chiefly whatever individuals, in any of the three kingdoms of nature, there is an internal principle or agent causing effluvia to come forth; and in the atmosphere, in which they are, a resistance to these motions outwards, suitable to the nature and motions of its parts and the determinations belonging to those motions.

Sir, I fancy, but with submission to better judgments, that if these three were with application and diligence looked into, they might contribute something towards an explication of sundry phenomena in nature, such as, first, gravity, by which I understand the *vis centripeta* in the parts of a planet, whether united or to some certain distance separated from it. This seems to be a natural and necessary result from such a plenitude as is named above. Secondly, the order, distances, motions, which their regularity in the planetary system of the planets, whether primary or secondary, being and moving therein. Thirdly,

those *Æstus atmosphæræ*, or air-tides, to which my last referred, and those sundry variations of the air, and effects considered in meteorology, which possibly may be found to owe their origin to, and to depend upon, those opposite pressures proceeding from parts central and circumferential acting and reacting upon one another. As for the vigour I noted to attend the diurnal motion of the earth about its axis, toward the moon, in the southing and anti-southing senaries, I am by many observations inclined to think, that it comes from the terrestrial effluvia in those times at liberty to flow forth more plentifully. And consequently the abatement thereof in the ebbing senaries is from advantage then coming to the circumferential pressures, at liberty to repress these effluxes from within the earth.

Fourthly, culinary and vital fires, both which kinds move *à centro;* particularly life, as to its nature, original progress, state sane or morbose, decay and dissolution, may have some light from a nearer and accurate inspection into these. Sir, my narrow and but late observation, and that much interrupted, supplies me with enough to make a volume upon this noble subject.

But if there be anything worth regard in what I here offer, he to whom I write will see it without large discourses: and if there be nothing, I have in this already said too much. I am, &c.

Chedsey, near Bridgwater, Jan. 20, 169$\frac{3}{4}$.

P. S.—Lately reading Mr. Leweng's 'Observation of Scales in our Skin,' it gives me occasion to reflect upon the wisdom of Nature, in providing for the regulating of transpiration. That the circumferential pressure may not hinder it too much, fishes, in their elements, need a stronger and larger scale than we do in ours.

Note.—This hypothesis its learned author applies in his following letters to the solution of divers phenomena, as magnetism, the variations of the weather, the tides, and

their senaries, and the things he imagines to happen in them (of which see the Philos. Trans., No. 202). Also to the repositing of fossil-shells in high mountains, the life and health of animals, and some other matters. But because the letters are long (not to say tedious by reason the hypothesis is abstruse and somewhat strained), I have thought they would take up too much room, unless I could have been so happy as to have obtained Mr. Ray's answers, which no doubt were very considerable; but that I could not do with my greatest diligence.

W. D[ERHAM].

Mr. RAY to Dr. ROBINSON.

SIR,—You are, I perceive, not as yet satisfied with the addition of Provincial Catalogues to Camden; to which I reply, that I am not concerned for the beauty or decorum of the work: let the undertakers look to that. As for these Catalogues, I have promised them, and they have accepted, and I must be as good as my word. I have already sent up those from Cornwall to Kent, and have received a letter of thanks from Mr. Gibson, who manages the whole work for them, and seems by his writing to be a good scholar and ingenious person; so that I perceive they have a great opinion of my contributions, and better I think than they do deserve. I have, upon your suggestion, made more additions to Cornwall: as first, I have given them a general catalogue of all the sea-fish taken on those coasts, with synonymes. 2. A catalogue of the more rare sea-fowl. 3. An account of two or three sorts of stones digged there. 4. A short account of the improvement of the soil by sea-sand. 5. A more full description of some antiquities, viz. the Hurlers and other stones. 6. Something of the manners and language of the present inhabitants. As for other counties, I told them I had neither will, nor skill, nor leisure to do the like.

The metals, minerals, and other fossils, are many of them taken notice of by Camden in the places where they are found; and as for the plants, had he known what had been rare and peculiar in every county, I perceive, by what he hath done in some, he would have mentioned them in the places whereof they are native. And now that I am speaking of local or provincial plants, give me leave to tell you that I think you labour under a mistake, in thinking and asserting that few or no plants are peculiar to this or that shire. Be pleased to resolve me where *Calceolus Mariæ* [*Cypripedium Calceolus*, Linn.]; *Christophoriana* [*Actæa spicata*, Linn.]; *Lysimachia lutea flore globoso* [*Trollius europæus*, Linn.], *Pentaphylloides fruticosa* [*Potentilla fruticosa*, Linn.], *Polygonatum floribus ex singularibus pediculis* [*Convallaria Polygonatum*, Linn.], *Pyrola folio mucronato serrato* [*Pyrola secunda*, Linn.], *Pyrola Alsines flore brasiliana* [*Trientalis europæa*, Linn.], *Ribes alpinus dulcis* [*R. alpinum*, Linn.], *Saliæ pumila montana folio rotundo* [probably *S. herbacea*, Linn.], *Sedum alpinum Ericoides cæruleum* [*Saxifraga oppositifolia*, Linn.], *Sideritis arvensis latifolia hirsuta flo. luteo* [*Galeopsis ochroleuca*, Lam.], *Thlaspi foliis Globulariæ* [*T. alpestre*, Linn.], *Lunaria vasculo sublongo intorto* [*Draba incana*, Linn.], and *Valeriana græca* [*Polemonium cæruleum*, Linn.], grow wild but in your own native county of Yorkshire. I could give you as large a catalogue of peculiars in the little county of Westmoreland. But to instance no more particular shires, I shall only add, that I know very few counties in England wherein I could not instance some peculiars. But I am come to the end of my paper.

Mr. Ray to Dr. Hans Sloane.

'Black Notley, April 4, —94.

Sir,—I have this morning sent back by carrier your descriptions and draughts of birds, for the use whereof I return you thanks. I have also sent in the box a small parcel for Mr. Smith the bookseller; which, if he doth not send for soon after it comes, I entreat you would please to convey to him. I have put in some papers containing my conjectures about some of the species; two or three I sent before in a letter, the receipt of which you make no mention of in your last concerning the Cuntur [the Condor, *Vultur Gryphus*, Linn.], which the last post brought me. To say the truth, before the receipt of your letter I was suspicious that the story of the Cuntur was fabulous and romantic, and that indeed there was no such bird in nature, and therefore made no mention of it in Mr. Willughby's 'Ornithology.' But by your letter I am now convinced of the truth of it, and shall therefore add it to my Synopsis. I am now more and more confirmed in my opinion that there are many species both of fishes and birds, and of these last especially aquatic, common to Europe and America; but why more water-fowl and more water-plants deserves consideration. I suppose among the numerous species of Hernandez's Mexican small birds there may be some the same with some of yours, but I was too slothful to compare them. My wife salutes you with her service, and I am

Sir,
Very much yours,
John Ray.

For his honoured friend Dr. Hans Sloane,
at Montague House, London.

Mr. Ray to Dr. Robinson.

B. N., April 11, —94.

Sir,—There are some things new in my 'Synops. Av. et Piscium.' By new, I mean such as were not comprehended in Mr. Willughby's works. Those are—Hernandez's Mexican Birds. 2. Some names and descriptions of Birds out of Nieuhoff. 3. Frid. Martèn's Spitzberg Birds and Fishes. 4. Sir Robert Sibbald's Whales. 5. Dr. Sloane's Jamaica Birds and Fishes. 6. Your Birds and Fishes taken out of the Leyden Catalogue. And lastly, some few things out of Du Tertre. Those Birds of Hernandez being shortly described, and no figures added, are very puzzling and confounding: a little to illustrate them, and make them easier to be compared with the descriptions of other authors, I have reduced them to a kind of method according to their bigness.

2. I will not confidently affirm that there are in this island any topical plants so peculiar to one place, or spot of ground, as not to be found in any other. Some species, which for a long time I thought to be such, I afterward found myself mistaken in; for example, *Eryngium vulgare S. campestre* [*Eryngium campestre*, Linn.], *Rhamnus secundus Clusii* [*Hippophae rhamnoides*, Linn.], and *Pisum maritimum Aldeburgense* [*Lathyrus maritimus*, Big.], to which I might add the Box-tree: yet I am verily persuaded there are some such; as to name no more, *Periclymenum parvum Prutenicum Clus.* [*Cornus sanguinea*, Linn.], and *Calceolus Mariæ* [*Cypripedium Calceolus*, Linn.] But that there are some peculiar to a county, and that few counties of any extent want such, is my present opinion and assertion. However, it is enough for my purpose, and I pretend to no more, than that there are some, for aught hath yet been discovered peculiar to each county. Nay, in these Catalogues [added to Camden's Brit.] I pretend not to so much, but have entitled them

only 'Catalogues of more Rare Plants growing in this or that County,' not affirming them to be peculiars. You must needs grant, that different soils and different climates, and tempers of air, produce different species; and consequently the mountainous and northern parts of this island differ from the more level, depressed, and southern, not to confine ourselves to counties. But enough of this.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, April 13, —94.

SIR,—This post brought me yours of the 12th, whereby I understand that you have not as yet received the box, and that my letter came to you a post later than by its date it might have done. To put you out of all pain about it, a double unlucky accident hath occasioned all this trouble. First, my letter, by the negligence of the postboy, was not sent the day it was written; and then the box was committed to a friend in Braintree, who promised to send it very carefully, but I suppose did it not, by the carrier I use to employ. This friend is at present in London, so that I cannot give you that satisfaction I desire. But I am very confident the box is safe, and that we shall retrieve it, for I never yet lost anything going or coming by carrier. Thus much I thought necessary to signify speedily, in part to ease your mind, and to assure you that nothing shall be wanting on my part to procure and convey the box to you, knowing well the importance of the papers therein contained. So I take leave, and rest.

Sir,

Your affectionate friend and humble servant,

JOHN RAY.

For his honoured friend Dr. Hans Sloane,
at Montague House, London.

Mr. Ray to Dr. Hans Sloane.

Sir,—I received yours of the 17th, and am very glad that the box with the papers is come safe to your hands, though I did not much fear the loss of it. You need not be solicitous about the charge, for there was nothing extraordinary, and yet if there had, I ought in all reason to have borne it.

Two things there are I cannot yet fully agree with you in—1. The referring of the old-men or rain-fowl to the cuckoo. For the cuckoo is so strange, anomalous, and singular a bird, and so remarkable, and taken notice of even by the vulgar, for his voice, manner of breeding, and absconding all winter, that I think no bird that agreeth not with him in these particulars ought to be joined with him, neither is the length of the tail a sufficient argument; for the synx, a genuine woodpecker, hath a tail as long in proportion to his body, and marked with cross-bars too. 2. In referring the Savanna-bird to the lark-kind. For that distinction of small birds into slender and thick-billed, or, as our fowlers phrase it, into soft and hard-beaked, dividing the numerous genera of them almost equally, is of such eminent use for the clear understanding and ranking of them, that I think it ought by no means to be rejected, or the birds of those kinds confounded, though the places they frequent, and their shape and manner of living may agree, and that characteristic note of the lark-kind may be common to some of them, I mean having a very long back claw or spur. I have taken notice of some that agree with larks in these particulars, as the bunting, and a sort of mountain finch. Yet I believe that there is a difference in the diet of these birds. For the slender-billed, though they feed upon the pulp and grains of fruit, yet they seldom meddle with dry seeds unless driven by hunger. But the hard-billed touch not

pulpy fruits, but feed upon dry seeds, as all sorts of grain and thistles, &c. To feed upon insects is common to them both.

Your opinion or conjecture of the Rabihorcado being a kind of fork-tailed lavus or sea-swallow I very much approve and agree with you in. I fancied that they were no palmiped bird, because those that write of them wonder that they should be found so far out at sea, which is no wonder in a lavus.

My wife salutes you with the tender of her very humble service. The ulcers upon my leg, which I thought had been perfectly healed and dried up, continuing well all winter, are this spring broken out again, and become very troublesome and painful. They puzzle my philosophy, and I am at some loss how to order them. I am,

Sir,

Your very affectionate friend and humble servant,

JOHN RAY.

B. N., April 23, —94.

Mr. PASCHALL to Mr. RAY.

SIR,—I was lately thinking that this globe, in several parts, and times, and states of it, sends forth various effluvia, sulphureous, nitrous, aqueous, &c., in greater abundance, one or other, or compositions of them, as causes concur.

I have suspected, that in this unusual constitution of the air we are now in, the sulphureous steams have abounded, partly from beautiful and promising blowing of fruit-trees, and from the warmth of the season, and from the frequent lightnings we have. Last night I noted in my own orchard, in this my low country habitation, what confirms me in it. Walking between two fair coddling hedges I noted something to fall white upon my hat: it

felt clammy, and tasted sweet; I took it off with my knife, the white grains ran into a clear liquor, and in a short time I was able to get together a small quantity into a little gallipot that I keep; upon shaking of any bough this would fall as a mist doth. All day in these hedges was a noise as of a swarm of bees. We saw it lying upon the leaves as well as blossoms. I have noted honey dews, which do much hurt to our corn; but never thus early, nor in this form of manna. Taking some on a broad smooth leather, I observed they did not dissolve presently, but run along as small round seeds, upon the motion of the leather.

Chedsey, April 24, 1694.

Mr. PASCHALL to Mr. RAY.

Chedsey, May 25, 1694.

SIR,—I was engaged in a journey when your last came, and observed in both going out and coming home, that taking in both the rising senaries I was much less weary than I use to be if I travel in a falling senary. This holds with me generally, as I have many times noted. I also noted, as I have done frequently, that in the ebbs, the mid-heaven about the zenith was clearer, and more free from clouds in a cloudy, and nebulæ in a nebulous season, than the parts nearer the horizon, and that it was *vice versâ* in the tides.

I know one who commonly finds that if he take but a very gentle purgative in a rising senary, or the former part of a tide, it works not till the ebbing senary begins, and then doth very kindly. And he takes it for a rule, that in tides the healthy are best, and the sickly worst, but in ebbs the contrary holds. He also thinks, upon several trials, that the surface of a wholesome earth opened in a tide, emits steams that are more salutary and healing,

and corroborating than the same doth send forth in ebbs. But I stop a rambling pen, and ever rest, &c.

P.S. The miraculous cure upon the French maid was in the midst of a tiding senary;* the power that effected it made use of a heightened imagination, and a vigorous season.

Mr. Lhwyd to Mr. Ray.†

Honoured Sir, — Your last was of January 22, since which time I have not been able (though I have endeavoured it very much, by sending queries to the country) to give you any farther and more accurate account of that prodigious fire I then alarmed you with. I understand only, in general, that it lasted at least three or four months; nay, some add that it still continues, though not in the same place, but appears up farther in the country, and that it has been also commonly seen on the sea coast of Caernarvonshire. The reason that induced me, at the beginning, to think of the locusts, was only a random guess, that so strange and unheard of effects must proceed from some cause no less unusual; for if ever our sea or land had been capable of their own nature to produce such a meteor, I should expect to find it recorded, that at one time or other, in the revolutions of some centuries, such a thing had happened.

You have probably seen, ere this, the 'Phil. Trans.' of February, where there is all the account I could give of the locusts, but no figure of the animal, though I sent it up, and Mr. Waller promised to have it engraven. I have been informed since that many of them have been

* Of these senaries see Mr. Paschall's opinion in Philos. Transact. No. 202.—W. D[erham].

† There are divers letters of Mr. Lhwyd to Mr. Ray, relating to this unusual fire here mentioned, which I omit publishing, by reason there is an account of Mr. Lhwyd's and Mr. Jones's in 'Phil. Transact.' Nos. 208, 213; but this letter having some of Mr. Lhwyd's thoughts about it not there published, I thought it convenient to entertain the reader with it.

W. D[erham].

seen amongst the sea weeds at Lhyn, in Caernarvonshire, and also in the Severn sea, in Monmouthshire. It was my suspicion that the infectious exhalation of these dead locusts might kindle, &c.; for Pliny tells us that even whilst they live, *multa contactu adurunt.* There has been, and still continues, a great mortality of cattle, horses, sheep, and hogs, about the place where the fire happened. Some say cattle were wont to die there formerly, others only that it was no good thriving or feeding-place for them; but all agree in that it never was infectious anything comparably to what has happened this year. These locusts, it seems, came also last year into Germany; and Job Ludolphus (as you find by the inclosed) designs a particular treatise of them, wherein he will maintain that the quails, wherewith the children of Israel were fed in the wilderness, were no other than these creatures.

Oxford, May 27, 1694.

Mr. PASCHALL to Mr. RAY.

SIR,—I lately received from a worthy friend in Oxford, in an eminent station there, proposals for a method of providing for the widows and children of poor clergymen, which took so in one county, that in a short time, by the voluntary subscriptions of clergymen, there was raised near £100 per annum for five years as an essay, with expectation of much more there. When a trial was made here to see how it would take in the country, there was a beginning made with great alacrity; and when it was recommended to our bishop, and the dean and residentiaries present in Wells, it received encouragement there from every one of them; and Dr. Jurden, your neighbour, writes me word that he will advise with the Bishop of London, and the archdeacons, and chief of the clergy in Essex about it: wishing his endeavours may

have good success. The thing is particularly recommended to me by this consideration, that this well settled may be as a channel into which particular and private charities may be derived, in which they may run to the named good purposes, and to still higher and better, if, under the Divine blessing, it shall go on and prosper. If you meet anything for or against it, you will oblige me by the communication.

Ch. August 20, 1694.

Mr. Ray to Dr. Robinson.

Sir,—There are three particulars which I must beg information from you concerning. Whether there be sufficient authority that the blood of a living hedgehog is cold to the touch? which Dr. Lister takes for granted. I never read of any but Segerus who did affirm it, and do much doubt of the truth of it. 2. Whether the blood flowing from the artery of a living fish, between the heart and the gills, be of a florid red, like the arterial blood of quadrupeds, as Dr. Lister affirms? 3. Whether the venal blood of an animal may by any artificial compression or constriction be changed into the colour of the arterial? To which I shall add a question more, viz. Whether in the chicken before exclusion there be any foramen ovale, or arterial channel for the passage of the blood, while the lungs lie vacant.

Dec. 20, —94.

Dr. Robinson to Mr. Ray.

"Sir,—Some of your queries I can answer, as that relating to the blood of a hedgehog, which I found to be warm to the touch when I was at Mr. Clutterbuck's, in Essex, where I was particularly curious to examine that

particular; but I would not be quoted against Dr. Lister, lest he should take it ill.

I never observed the arterial blood of a fish to be as florid as that of quadrupeds.

I do not think that the venal blood of animals can by any artificial compression or constriction be changed into the colour of the arterial. I am sure that the air immediately changes its colour and consistence upon phlebotomy.

I cannot answer that of the chicken before exclusion. I wonder Aquapendente, Harvey, Malpighi, and others have not cleared it.

London, December 20, —94.

Mr. Burrell to Mr. Ray.

Sir,—I have, sir, in some of my melancholic hours, been diverted by the Tract I have of yours, and particularly your 'Synopsis Animalium,' &c., wherein I observe your opinion settled against equivocal generations, and fol. 15, confirmed by many arguments and great authorities, yet, if I had leave, I would ask if the species of worms bred in human bodies, or those of brutes, are at any time observed to be generated elsewhere, for I should think it would be hard to say their eggs are conveyed out of one man, or one horse, into another; and the *phthiriasis*, which I suppose is where worms are bred in the flesh, and which happens to one single man in a nation, and that perhaps once in a hundred years, will be more difficultly answered, where that species of worms or lice do all that time conceal and preserve themselves, and at length light upon this single person. But, sir, it is said by somebody, "Sequimur non quà veritas sed quà ratio trahit:" whether that be applicable here or not I pretend not to determine. I observe likewise, fol. 300,

you say, "Quod non verisimile videtur quodvis animal à naturâ ita factum esse, ut cibi deglutiti partem aliquem vomitu semper aut etiam frequenter rejicere debeat." I should here inquire whether the castings of hawks, which you know constantly throw up lumps of flix, or feathers, or down, &c. (the wild as well as the reclaimed), bring any of the food up with them. In fol. 309, I presume there is an error in the print, i. e. *Hirundines* for *Hirudines*. You see, sir, how confidently, not to say impudently, I trouble you with what I myself cannot believe will deserve your considering; but, however, this shows you I read what you give (though not with that advantage which a man of a wiser head would do), and it is an evidence, likewise, that I rely very much upon your candour and friendship to forgive such impertinencies.

Jan. 9, 1694.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Feb. 3, —95.

SIR,—Your extraordinary kindness merits great thanks from me, and your ingenuity, in being willing so frankly to communicate to me the sight and use of your labours, no less, but I am not free to make use of them till published, lest I should in any measure prejudice the sale, by rendering the contents not absolutely new to the world; but as for the reputation of being first author and discoverer, I hope I shall not prejudice that, because I shall acknowledge of whom I had them, with as ample a character of the benefactor and contributor to my work as he justly deserves.

I am much of your temper as to the clearing up of obscurities, and I doubt not but you have done more in that, in reference to Hernandez, than any man yet hath; and I should be very glad to see your papers, but I am in no haste. I shall not be able to finish my Supplement

this summer. I take into it all the last six volumes of the 'Hortus Malabaricus,' and Plumier's first vol. I hear there is a second published already by him, but have not yet seen it.

I am now upon a little treatise concerning the method of plants, wherein I shall give a more particular account of the several methods that have been attempted, and especially of my own, with an answer to what Monsieur Tournefort hath objected against it. In the meantime I do not altogether neglect the prosecution of the History of Insects, which I intend to extend no further than to take in such as are found within two or three miles of my habitation. My wife gives you her humble service, and I am,

Sir,
Yours entirely in all offices,
JOHN RAY.

For Dr. Hans Sloane,
at his house, at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Feb. 12, —95.

SIR,—Yours of Feb. 6, with the inclosed papers, came safe. I have, according to your desire, read them over with some attention, yet not so much as they require and deserve. I was very much satisfied with them, and informed of many things I was ignorant of, or did not clearly understand before. I find nothing that I can censure or reprehend. What I do not fully understand I may afterwards acquaint you with, and desire satisfaction in. The language, as far as I am able to judge, is proper and good, only some typographical errata there are, which I suppose yourself have taken notice of, and

yet none of them, except in the Greek words, considerable. Your instructions in letting nobody have a sight of what you sent shall be observed. I cannot but admire your patience in turning over so many voyages and relations of travellers, besides herbarists and other authors, and making collections out of them, and that to so good purpose, to correct mistakes, to clear up difficulties and obscurities, and to contract the number of species. Your method is good enough, for I suppose you intend not to be very critical and exact in that. In your next be pleased to tell me how far the press hath proceeded in this previous work, and by what time you think it will be wrought off and published. I suppose the succeeding summer will not suffice to perfect my Supplement, which yet I shall carry on as fast as my necessary affairs and occasions will permit. So I take leave, and rest,

Sir,

Your much obliged and affectionate friend and servant,

JOHN RAY.

For Dr. Hans Sloane,
at his house, at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Feb. 21, —95.

SIR,—I deferred not to read over the papers you last sent me, and was much pleased and satisfied therewith; and would I act the critic, could find very little, if anything, to carp at or reprehend therein. You have, in my opinion, done botanists great service, by illustrating and clearing up many obscurities in authors, and contracting and reducing to one many plants distracted into many species by the unskilfulness of some, and misapprehension of others, even the best writers, who, having

not seen the plants themselves, but only meeting with descriptions or light mentions of some of their parts in some, and others in other travellers, must needs be at a loss about them, and often multiply species beyond what there are in nature; or else, for fear of unnecessary multiplication, contract two or three into one, as I find myself to have done more than once or twice.

Give me leave only to ask you, for my own satisfaction, two or three questions. 1. Whether your *Phyllitis non sinuata minor, apice folii radices agente* [*Asplenium rhizophyllum*, Linn.] be the same with, or different from, that of Mr. Banister, figured in Dr. Plukenet's 'Phytography,' Tab. 105? 2. Whether you did not observe two species of maize in Jamaica? I think I have myself seen two different kinds; and I remember there is mention made of two in one of the 'Philosophic Transactions' lately printed, which I cannot now find. 3. Why you make the *Cara brasiliensibus Inhame de St. Thome*, &c. of Marcgrave [*Dioscorea alata*, Linn.] different from the *Ignàme seu Inhame*, Clus. 'Var. Plant. Hist.' l. 4, p. 78, both coming from the same island? 4. What reason you have to suspect the common *Xylon* or *Gossipium herbaceum* [*Gossypium herbaceum*, Linn.] not to differ specifically from the *Arboreum*, or *Aminiju brasiliensibus*, &c. of Marcgrave, seeing in the common *Xylon herbaceum* the cotton sticks fast to the seed round about, which it doth not to the seed of the *Bombax offic.* (which I take to be that of the *Aminiju*), and besides is not so situate nor black of colour as that is?

You have enlightened me in many things; and the collections I may make out of your work will be the best part of my Supplement.

I am very glad when myself or friends discover any errors or mistakes in my writings: thank God, that he hath let me live so long as to acknowledge and amend them. I have not yet compared the titles of your capillaries with Plumier's descriptions, for the figures I have not by me, having remitted the book Mr. Smith sent me.

My wife sends you her very humble service, and repeated thanks for your great kindnesses, by the hand of,

Sir,

Your very affectionate and much obliged friend and servant,

JOHN RAY.

This letter should have been sent last post, but that I failed of a messenger. I shall add now a question or two more.

1. Whether may not your Milkwood be the *Pirm-pinichi sive arbor lactescens* of Monardes, which occurs in the first tome of Jo. Bauhine?

2. Whether your sweet-scented Jamaica pepper be not certainly a species really distinct from the *Amorum aliud quorundam*, and *Caryophyllon Plinii* of Clus., as I take it undoubtedly to be from the leaf and fruit?

For Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Aug. 25, —95.

SIR,—I have this morning, by carrier, remitted the three tribes you were pleased last to send me, and return you thanks for the use of them. I am the more hasty in despatching them, because, as I think I told you, I would gladly have gone over the whole work before the extreme colds come, which will render writing difficult and troublesome to me, if it please God to produce my life so long.

I do not find anything amiss in matter or language. I must impute it to my own dullness and incapacity if I do not sometimes apprehend or rightly understand your meaning. I was much surprised with your description

of the reservatory of water made by the disposition of the leaves of the *Viscum caryophylloides*, [*Tillandsia lingulata*, Linn.?] which was a thing wholly new to me, having never heard or read of it before. I thank you for your good advice concerning my herpeses, but hitherto I linger and use nothing; but the pruritus which attends them now, more than lately, will quicken me to attempt something for their stopping and cure. My wife salutes you with the tender of her very humble service, and I am no less,

Sir,

Yours in all service,

JOHN RAY.

For his honoured friend Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. LHWYD to Mr. RAY.

DEAR SIR,—The first of your queries was, whether the impressions be all of leaves, or parts of leaves? To which I answer, that the stone wherein these mineral leaves are exhibited is generally so brittle, that when we endeavour to split it, to get out a plant, it breaks also transversely; so that, for one whole fern branch we find, we see twenty broken ones, but for single leaves, they are very common. Moreover, those stones are broken in such small pieces by the workmen in the pit, that we find few lumps big enough for whole plants; and indeed if they contained whole ones, it seems impossible so to split them as an entire plant should be exposed to view. Howbeit, it has not been my fortune hitherto to meet with any other parts of plants than either single leaves or branches; whether there be any roots or flowers to be met with I shall endeavour, God willing, to be informed hereafter. Your other questions are, whether they are found smooth or crumpled, and whether we meet with the impressions

of each side of a leaf? To which I answer, they are always smooth and fair, and that I have seen both sides of leaves. Nay, lately (since the date of my last) I have seen both sides of the same numerical leaf, so that I can now confirm that observation of Dr. Woodward's, which I mentioned in that letter. I have sent you here a figure of one of these coal plants, from which, and those in Camden, you may make some estimate of the rest. I found it at a coal-pit in the forest of Dean, together with several others. As, 1st, Hart's Tongue; 2dly, a kind of Trichomanes; 3dly, *Lonchitis aspera*, called by the workmen Vox Vearn, i. e. Fox Fern; 4thly, a kind of Equisetum, which they call Cat's Tail; 5thly, a small Gallium, or Mollugo, with some others which I know not whither to refer. This seems to resemble partly the Osmund Royal, but to me the leaves are too small, too thick set, and round-pointed; but I leave you to match it, who are best able.

Oxford, August 28, —95.

Mr. Lhwyd to Mr. Ray.

Honoured Sir,—I received your letter of the 4th; and that you may have a truer idea of these subterraneous plants than I can possibly give you by correspondence, I have sent this day, by the carrier, a small box of them, directed for you, to be left with Mr. Smith. I had brought a great clod of them, about half a year since, from the forest of Dean, and had buried it in the ground here, in a moist place, in hopes it would keep the better, the figures being very apt to disappear after some months' keeping. This, at the taking of it up, crumbled to pieces. However, I have sent it to you as it is, and hope it may serve to give you as clear a notion of the state of these fossil leaves as if you were yourself at the coal-pits. I have also added those three specimens I have figured in

Camden, though one of them (I mean that which I suppose to be an undescribed plant) I was willing to venture only the one half, not knowing whether I may ever meet with the like again. These three are much fairer than those we have from Gloucestershire and Somerset, and lodged in firmer stone. When you have viewed them sufficiently, be pleased to take what you like out of the Gloucestershire parcel, and return the rest to me at your leisure. I heartily wish you may be able to satisfy yourself upon sight of them, whether they are original productions, or the remains of once real plants; for I must confess that at present I cannot acquiesce in the opinion of their having been once mere plants growing on the surface of the earth. I have in my custody a piece of native silver, lodged in spar, brought, four years since, out of the West Indies, whereof some part appears out of the stone, in the form of a small spiral or twisted capreoli; and another part is a thin plate, having such a superficies on each side, as if it had received an impression from a piece of fine cloth. Now, seeing that fossils do naturally shoot into these forms, may we not reasonably suspect they might also put on the shapes of leaves and shells? I have likewise several times seen somewhat like the form of a piece of fine linen in flint, which seems to require no less admiration than these plants, though we are the more affected with them, because we find the same natural things in the bowels of the earth as we knew before on the surface. However, I am almost fully convinced, and have been so for several years, that many of those vertebræ and shells which I have met with are the spoils of once living animals, my chiefest reason for which is, because many of the vertebræ and other bones are of a mere bony substance; and several shells which we meet with are scarce distinguishable in consistence from the same species on the sea shores.

Oxford, Sept. 12,—95.

Mr. Ray to Dr. Hans Sloane.

B. N., March 10, 1696.

Sir,—The spring coming on, and the weather now favouring, I am desirous, with all convenient speed, to finish and prepare for the press my Supplement. Hist. Plant., not that I think the booksellers will be very forward at so difficult a time as this to be at the charge of printing it, but because I would rid my mind of the thoughts of it, being sensible that my glass runs low. I desire, therefore, that you would please, so soon as may stand with your convenience, to send me your Observations and History of the Jamaica and other American Plants, which you were so kind as to offer me the sight and use of. I should not have had the confidence otherwise to have begged such a favour of you, but should have contented myself with the names and titles I had found in your Catalogue, the greatest part of my Supplement being only a collection of such names and titles gathered out of books; but yet, notwithstanding your kind offer, if, upon second thoughts, you judge it may be detrimental or prejudicial to the sale of your work to permit me to deflower it, or take excerpta out of it, I shall be willing rather to want such ornaments and advantages to my book than to be thereby injurious to you. It being now so long since I received a letter from you, I am not without some fear that you may not have been well; and therefore for my satisfaction therein, and the premised particulars, please to send me a line or two. So I humbly recommend yourself and family to the Divine protection and blessing, and rest,

Sir,

Your very affectionate and obliged friend
and humble servant,
John Ray.

My wife gives you her humble services.

For his honoured friend Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, March 22, —96.

Sir,—I received both your letters, and must needs acknowledge myself extremely obliged to you for your extraordinary and unmerited kindness. The sugar you design me I cannot, without some violation of modesty, receive, having no prospect of making you any other amends than verbal, by acknowledging the obligation and returning thanks. The reason why I desire to hasten the finishing my Supplement is, because I am sensible my time is but short, and I would willingly get it off hand, that I may have some time to spare before the access of death. Yet do I not intend to part then with the whole copy, or put it all at once into the bookseller's hand, but by piecemeal, as it is printed off. You tell me news of posthumous pieces of Malpighius, but I since find them in the catalogue of books printed for Hilary Term, which I received last week. The weather is again grown very sharp, which, if it continues so, will hinder my proceedings, being unable to continue long from the fire to write much. I am at present, I thank God, in health, as I hope yourself and family are. The sores upon my legs are in a likely way of healing up shortly. I have of late made use of a new salve, made up of two parts of diapalma and one of basilicon, which I have experienced to be very effectual for healing and drying, though I must expect their breaking out again next winter, if I live so long. My wife gives you her very humble service. I shall expect your submarine tribe this week. I am,

Sir,

Your much obliged friend and humble servant,

John Ray.

For his honoured friend Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, June 23, —96.

Sir,—I received your very kind letter of June 6th, and not long after the acceptable present of your book, for which I return you many thanks. I cannot but admire your industry and patience in reading and comparing such a multitude of relations and accounts of voyages, and referring to its proper place what you found therein relating to your subject, and that with so much circumspection and judgment. You have done botanists great service in distributing or reducing the confused heap of names, and contracting the number of species. But who is able to do the like? No man but who is alike qualified, and hath seen the things growing in their natural places. For my own part, I do freely acknowledge myself altogether insufficient for such a task, having not seen the plants themselves, nor of many of them so much as dried specimens, and of the rest having had but a transient view. I shall therefore put down what I find in late writers, viz., Plukenet's 'Phytography,' the remaining six volumes of 'Hortus Malabaricus,' Father Plumier's 'Schola Botanica,' 'Paradisi Batavi Prodrom.,' 'Floræ Bataviæ Flores,' Tournefort's 'Elém. Botan.,' Breynius, his two Prodromi, and, above all, your 'Catalogue and History of the Plants of Jamaica and the Neighbour Islands,' which you are pleased so frankly to offer me the use of, without interposing my own judgment. Did I live about London, and had I opportunity frequently to visit the physic gardens thereabouts, and to observe and describe the new species, I might make a better Supplement to my History than now I shall do, my circumstances not admitting so long an absence from this place. I have been lately very ill and indisposed, with a hoarseness and violent cough, attended

with a feverish heat, of which I am not yet fully recovered. I hope you are well, and pray for your health. My wife sends you her very humble service. I must own myself to be much obliged to you, and am,

Sir,

Your very affectionate friend and humble servant,

JOHN RAY.

For Dr. Hans Sloane,
at his house at the corner of Southampton street,
next Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, July 17, —96.

SIR,—Since my last to you, considering my infirmities and craziness, admonishing me of the near approach of death, I think it best to speed the finishing and fitting my Supplement for the press, and to deliver it up into the bookseller's hand who put me upon it, to be published or suppressed, as he shall find it most for his own interest. I am sensible that it must needs be a very weak and imperfect thing, I wanting those helps which those that have travelled into the Indies and live about London have. But yet none so fit to make a Supplement to my own History as myself; and there be many faults I am advised of which I would willingly correct. But I would fain dispatch it, and rid my hands of it, that so it may be no disturbance to my thoughts. Your History, were it reasonable for me to beg the defloration of it, would afford the greatest ornaments to it. But I am almost come to a resolution not to desire any such thing of you, but content myself with the names I find in your Catalogue of such as are nondescripts, and with your synonyma for the reducing of such as are repeated.

I have gotten a sight of Dr. Plukenet's 'Almagæstum Bot.,' though as yet he hath not presented me with a copy of it; I find in it many mistakes in the language, and in the composition of Greek names; and I doubt not but there are many in the matter. It is impossible but that a man who relies wholly upon dried specimens of plants (be he never so cunning) should often mistake and multiply. He hath abundance of Jamaica plants, which, if in your Catalogue, it is very difficult to reduce them, especially his Filices. As far as I am able to judge, he is often out in his conjectural synonymes; in one or two he is reprehended by Mons. Tournefort, and is of himself apt enough to multiply species. But no more of him.

I am not yet quite rid of my distemper: I hope it will off by degrees. Here hath been a very unseasonable summer, for the most part very cold and wet, and I live in a sharp air, my house standing on a hill exposed to the north and north-east winds, which is inconvenient for one who is subject to colds, and whose lungs are apt to be affected. Excuse this *περικυτολογία*, and take me to be, as really I am,

Sir,

Your much obliged friend and humble servant,

JOHN RAY.

I must not forget my wife's service, who is very much yours.

For Dr. Hans Sloane,
at his house at the corner of Southampton street,
next Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, July 22,—96.

Sir,—I believe you cannot but wonder that I should at this time so pester you with letters, of which I am not wont to be very prodigal. For giving you the trouble of this I hope you will excuse me when I shall have told you my reason. Coming to examine and distribute the capillary plants [Ferns] in Dr. Plukenet's 'Almagæst.' according to my method, I find such a multitude denominated of Jamaica, that I am quite confounded with them, and unable to reduce them (I mean so many of them as are probably the same) to those of your Catalogue without your assistance and direction, which I earnestly beg of you. I mean that of such as are not referred to F. Plumier's, you would tell me which you think are referable to those of your Catalogue, and to which each, and which are new and strangers to you.

In the mean time I cannot but wonder how and from whom he should procure so many Jamaica capillaries; who in that island should be so skillful and diligent as to find out and collect so many; and whether he did not get a sight of some sheets of your Catalogue. I dare say before your discovery, no herbarist imagined there had been half that number to be found there, nay, I think I may say in all America. I fear this task I impose upon you may be too laborious for you, and rob you of more time than will consist with your business and necessary occasions, and therefore I do not absolutely desire it, but only if you have will, and can find leisure sufficient; for I had rather have it not done than to put you upon anything that may be unpleasant or incommodious to you. For the doing of it take your own time. I find it difficult to settle the genera of these capillaries by certain characteristic notes. I pray tell me your notions of *Phyllitis, Hemionitis, Lonchitis, Polypodium, Tricho-*

manes, *Adiantum album* and *nigrum* and *ceterach*. Herbarists make ramose kinds of *Phyllitis*, *Hemionitis*, and *Lonchitis*, and therefore the differences of these plants must consist in the different figure and texture of the leaves. I am not yet perfectly well, but, I thank God, much better. I hope you are well, and pray for your health, resting,

Sir,

Your very affectionate friend and humble servant,

JOHN RAY.

For Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Aug. 5, —96.

SIR,—Your very friendly and obliging letter of July 21st came to my hands about a fortnight since. I give you most hearty thanks for the kind offer of the use of your papers of descriptions and observations of Jamaica Plants; as likewise of the sight of those dried plants and memoirs about them you received from the Straits of Magellan and the South Sea, and do accept of it. I shall proceed gradually, beginning with the imperfect tribes of *Fuci*, *Fungi*, and *Musci;* these I have already finished as well as I am at present capable, contenting myself with the names of some, and short descriptions of others. I am now upon the capillary tribe, wherein in my last I desired your assistance in reference to Dr. Plukenet's catalogue of such as he hath had an account of from Jamaica, for I was puzzled to reduce them; and could not but wonder how he could get such a number not observed or mentioned by you. I fear there are many mistakes in his work. A good number I have observed in synonyms of such species as are known to me, and I doubt not but there are many or more in such as are unknown. He is a man of punctilio, a little con-

ceited and opinionated, and such men are incapable of advice, especially reprehension.

I told you in my last what disadvantages I labour under in composing this Supplement, and shall add no more about it. I must do it as well as I can with the helps that I have. And by reason of my age and infirmities I am willing to make all the haste I can. As for the method of capillaries, though that I proposed in my letter to Rivinus seems to me the best, yet I have not skill enough to make use of it, but must be forced to employ my old one. Only now I shall take no notice whether ferns are cauliferous or not cauliferous, whether their whole superficies consists of mere leaves or no, but shall divide them according to the leaf, as before, into those which have a simple and which have a divided leaf, and these last into such as have a leaf divided singly, doubly, or trebly, as before.

Your advice in reference to my health I greatly approve, but all the symptoms of my cold are now gone, and I am as I used to be; only the ulcuscula upon my legs continue still, and are more painful and troublesome than they used to be in summer time, I suppose by reason of the coldness and moisture of the weather. Milk and milkmeats agree well with me, and I intend to make use of them. I return you thanks for your generous offer of sarsa and china, &c., and must not forget my former obligation to you for what of that nature you sent me the first year these pernios broke out. But I am not under any necessity at present to make use of your kindness, and if I were, I could not with modesty accept it.

My wife and children are at present (I thank God) in health, and tender their humble services to you. With humble prayers for your health and well-being, I conclude, and rest,

Sir,

Your much obliged friend and humble servant,

JOHN RAY.

For Dr Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Aug. 15, —96.

SIR,—I received yours of the 11th, and do hold myself extremely obliged to you for your readiness to assist me in compiling my Supplement. Your papers, if you please to do me so great a favour as to lend me them, to use for some time for the illustration and ornament of my work, I am now ready for them, having run over Dr. Plukenet's 'Almagæst.' wherein I find many mistakes, so that I dare not confide in him for things which I am ignorant or doubtful of. A man that relies wholly on dried specimens, were he cunninger than Dr. Plukenet is, must needs commit many mistakes.

As for the *method of capillaries* I proposed in my letter to Rivinus, I have not skill enough in that kind of plants to be able to make use of it, and so must be constrained to adhere to my old method a little altered. For whereas I did suppose that no *capillaries* were properly *cauliferous*, but that their whole superficies did consist of mere leaves. I am now convinced of the contrary, and therefore intend not to meddle with it any more, but to divide those plants, whether *cauliferous* or not *cauliferous*, according to their leaves, into such as have a simple leaf, which I make to be either whole or laciniated, and such as have a compound leaf. And these into such whose leaves are compounded of—1, *single leaves*, or *pinnulæ*; 2, *surculi pinnati*, or *decompositæ*; 3, *ramastri*, divided into *surculi* and *pinnæ*; which leaves Bauhine calls *ramose*. But to render things clear, I take it to be needful to define a compound leaf, which I shall do thus: *A part of a plant which is made up of pinnulæ, surculi, or ramastri, connected on each side to a middle rib growing gradually shorter and shorter towards the top of the middle rib, which also terminates in a leaf, the footstalk and middle rib having its supine superficies different from its prone*, viz. either flat or

channelled. Thus defining a compound leaf, I seclude several sorts of compound or pinnate-leaved plants from being *Phyllitides* or *Hemionitides*, &c.

The objection concerning the cocoa-nut you have very well cleared and answered. But your balsam tree cannot be Dr. Plukenet's, unless he be grossly mistaken in applying a wrong fruit to it, which yet I cannot wonder he should, since I find him often tripping.

Concerning the tree called cedar, in Jamaica, you have informed me, I took it to be no other than a sort of juniper. I once saw a young tree, in a vessel, brought from Barbadoes, which the seamen told me was the cedar, so like our European juniper that I could observe but very little difference; and Parkinson describes it for such, p. 1029, and you know that the *Oxycedrus* of herbarists is but a great juniper.

I must confess myself to have been stumbled about your making the two sorts of *Guaiacum* of Terentius and other authors to be all one, whereas Terentius seems to describe both from the sight of the plant and fruit communicated by Corvinus.

Discoursing with Mr. Vernon about the primary use of respiration, I expressed myself desirous to know the opinion of some learned and experienced anatomists concerning it, whereupon he recommended to me Dr. Connor as a very learned, ingenious, and experienced person in that kind; and I have since wrote to him, and received from him a very curious letter with a brief account of his opinion, since which, being informed of some medico-physical dissertations which he wrote and published at Oxford, I sent for a copy of them, and find the author to be indeed an ingenious man, and one that writes well in Latin. And finding him to dedicate one of his dissertations to you, I thence learn that he is well known to you and acquainted with you, wherefore I desire some further account of him from you, especially as to his temper of mind. I offered him a sight of my papers concerning the subject I mentioned, which he

accepted of. I shall desire my bookseller to send those papers to you and entreat you to communicate them to the doctor.

Mr. Petiver is a person well known to me, and hath contributed some observations to my 'Synopsis Stirp. Brit.,' and I shall, according to your advice, make what use I can of his skill for my assistance in this work.

I am troubled that I am constrained to put so many *nuda nomina* of plants without descriptions, but it is not to be helped. Many of them are not to be seen growing in England, and them that are I have not opportunity of seeing, so that many errors will creep in, let me use all the circumspection possible.

Please to tender my humble service to Capt. Hatton, and tell him that I should be glad to see Mons. Magnol's method, and if he please to lend it me I will return it carefully to him, when I have made what use I can of it.

I am very glad you have so well settled your domestic law business, which I had advice of from Dr. Briggs, and was fearful it might create you some trouble and disturbance.

My little family are, I thank God, at present all in health. We return you our hearty thanks for your good wishes. We often taste of your kindness, and as often remember you, and talk of you. My wife salutes you with the tender of her very humble service, and I am, sir,

Your very affectionate and much obliged
friend and humble servant,
JOHN RAY.

For Dr. Hans Sloane,
at his house at the corner of Southampton street,
Bloomsbury square, London.

Dr. VAUGHAN and Dr. WOOD to Mr. RAY.*

SIR,—And now, sir, I shall take the freedom to press you to favour the learned world with the icons of the plants described in your history, which would render it the most complete work of the sort the whole world affords; it is a work which you in your 'Historia Plantarum' express an inclinableness to, and which I am heartily sorry you have not met with due encouragement to perform. Sir, I need not lay before you the great difficulties which the lovers of botany are forced to encounter by reason of the want of this most desirable work, nor urge you how agreeable it would be to the botanic world, but especially to your curious countrymen; neither need I tell you, what without the least suspicion of flattery I justly may, that of all men that ever were in England, you are without dispute allowed to be the most fit to perform such a work. Pray, therefore, sir, think on some expedient by which we may be enabled to reprint your history, and render it complete by the addition of the cuts and another review, which will make it much more correct. I question not but that I can procure at least eighteen subscriptions in this poor kingdom for the promotion of so advantageous a work. But if you find that this will not quit cost, if you printed only the small icons of the plants and their names in quarto or octavo, I am confident you would highly oblige all that have the least curiosity to promote their knowledge in botanics. Sir, Dr. Wood, Dr. Mitchell, and I, have resolved to be as curious as our leisures will permit in making a collection of what plants this kingdom affords. We have begun this summer at Wexford, where we casually meet to drink the medicinal waters, and in the month we stayed there we made up a catalogue of

* Dr. Vaughan having given an account of the fatal consequence of eight young lads eating of hemlock water-dropwort [*Œnanthe crocata*, Linn.] (published in Phil. Trans., p. 283) proceeds thus.—W. D.

above 280 plants, the which we have, and design to augment as opportunity offers to any of us. Sir, I hope you will pardon this trouble, &c. F. V.

Clonmel, Aug. 26, 1696.

Sir,—In your Synopsis you question whether the Irish in drying their dullysk do not add some alkaline salt? I have inquired, and can assure you that they add no kind of salt, nor indeed anything else. They only pull it off the rocks whereon it grows, and spread it on the grass in the warm sun to dry, or rather on a lousy green mantle (as my friend adds, who gave me this relation, and has seen much of it dried and eaten in Kerry, and elsewhere) while drying. It sometimes appears frosted over with a salt, which for the most part falls off again in handling it, and is probably nothing else but the particles of salt remaining after the sun has exhaled the sea-water that stuck to it. When thoroughly dry it is fit for use, and may be kept seven years, if hung up in a net or the like. They eat it at all times, when no other food is to be had, but chiefly in the morning, and esteem it good against worms and the scurvy, and to cause a sweet breath. And now, sir, if it were necessary, I could muster up several arguments to press you to what myself and friend and colleague has urged about the icons, but you know well the necessity and usefulness of such a work; I would, therefore, at present only hint one thing, that it is pity that so beneficial a work is not promoted by public authority; and what if a motion were made, and effectually backed, next session of parliament, that it be carried on at a public charge? If it be objected, that our treasure is exhausted by a war, &c., I would answer, that (not to mention the hopes we have of a general peace) the French king, notwithstanding the tedious and expensive war he is engaged in, thinks it yet fit to encourage all arts and sciences. *Fas est et ab hoste doceri.* N. W.

Kilkenny, Aug. ult. 1696.

Dr. Hans Sloane to Mr. Ray.

Sir,—I have received, after much search, three sorts of beans from the north-west islands of Scotland, which are thrown up by the sea from the north-west great ocean, and gathered in plenty on those north-west shores, and are such as grow in Jamaica, viz. the bean called there cocoons, that called horse-eye bean, and the ash-coloured nickar, or bonduch. You will find them all in my Catalogue, under those vulgar names, by the index; there is also a fourth sent me thence, which is, I think, the *Avellana quadrifida*, J. B. Where its natural place is I know not; but the others you may find their countries by the authors which speak of them, for they must come to Scotland by the currents of the sea. I have heard of some thrown up in England, and should be glad to have your thoughts of this matter. The small coral in Falmouth Road you may see I found in England, and had it from the Magellan Straits. I beg your pardon for this trouble.

London, Sept. 11, 1696.

Mr. Ray to Dr. Hans Sloane.

B. N., Sept. 17, —96.

Sir,—Yours of Sept. 11th I received Monday last; in answer whereto, first, I return you many thanks for the pains you have already and shall further take in assisting me and promoting my work; but my haste is not so great as to straiten you for time, not intending to begin to print till next spring, so that you may proceed leisurely as your affairs and occasions will permit. I am sensible what a difficult task you have to clear up and reconcile things in difference between yourself and Dr. Plukenet, which would

soonest and best be done by conference and mutual inspection of each other's dried specimens. But I know not whether Dr. Plukenet will be willing to come to that, being a man reserved, jealous of his reputation, and none of the best natured, not to give him a worse character, being my friend.

What you write concerning the fruits gathered in plenty on the shores of the north-west islands of Scotland is very strange; I have formerly read something of it in the 'Philosophical Transactions,' I think, but gave no great heed to it, but now I see there was truth in it. It is very unlikely to me that they should be brought so far by any current of the sea. I should rather think they came from vessels cast away by shipwreck near those parts. But it is a thing very well deserves to be further and more diligently inquired into, sith the matter of fact is certain.

You make no mention of my papers concerning the primary use of respiration, which I desired Mr. Smith to send to you. My relatives here are (I thank God) in health, and join in the tender of their services to you. I humbly pray the like blessing to yourself and family, and take leave, resting,

Sir,

Your very much obliged friend and humble servant,

JOHN RAY.

For Dr. Hans Sloane, at his house
at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

" B. N., October 20, —96.

SIR,—I return you many thanks for your last letter of Sept. 25th, wherein you pleased to communicate many useful observations concerning our domestic plants, which I wish had been imparted before the publication of the last edition of my 'Synopsis Stirp. Brit.' However, they

will serve to enrich my 'Supplement. Hist.' You write like an ingenuous person and a lover of truth. Give me leave to acquaint you, that I think you are mistaken in making the *Milium indicum arundinaceo caule granis flavescentibus,* Herman. Cat.,* to be the same with *Sorgum,* which he makes a different plant; and the same with *Frumentum indicum quod Milium indicum vocant,* C. B. Theat. Bot. 488. Looking over your Catalogue, I find you refer to *Urtica* several plants, which have little agreement one with another, except in the figure of the leaf, and having a stamineous flower, and therefore I pray tell me what you make to be the characteristic note or notes of an *Urtica;* for neither *Folia adversa, spinulæ urentes, fructus racemosi,* nor *semina solitaria,* are common to them all.

I hope, ere now, my bookseller hath sent you my paper concerning respiration, of which I desire you would freely give me your opinion, and also communicate it to Dr. Connor, to whom I wrote, but doubt, for want of a sufficient direction, whether my letter came to his hands. My wife gives you her very humble, and I am,

Sir,

Your very affectionate and much obliged friend and servant,

JOHN RAY.

For Dr. Hans Sloane, at his house
at the corner of Southampton street,
towards Bloomsbury square, London.

Dr. CONNOR to Mr. RAY.

London, Bow street, Nov. 9, —96.

SIR,—Dr. Sloane has been pleased to give me your ingenious and learned 'Dissertation about Respiration,' to peruse it, which I have done with a great deal of satis-

* This plant and the *Frumentum indicum,* &c. C. B., are referred to *Holcus saccharatus* by Linnæus; but Sloane's *Milium indicum,* &c. is named *H. bicolor* by him.

faction and improvement, finding in it a great many solid observations concerning the respiration of fishes, insects, and other animals. I find that you think that the substance or body of the air passes from the bronchia and lungs into the substance of the blood; and that, *pabuli instar*, it foments and maintains the vital flame which you suppose to be in the sulphureous parts of the blood, as the air foments the common flame of a candle, and that the nitre has nothing to do in this effect.

You and I, sir, agree in this, that the body of the air gets into the mass of blood, and that its nitre there is of no use or energy. We agree, likewise, that the use of respiration is to rarefy and vivify the blood; we only differ in the manner how this rarefaction is performed. I know that there are very eminent men which are of opinion that the oily parts of the blood do constantly entertain not only a considerable heat, but likewise a true flame in the whole mass: you add to them that the air comes to foment it. I was much of this opinion myself not long ago, but you will be pleased to let me (with submission to your mind) to propose to you, in order to be informed, the difficulties I met with in this opinion. I find that those who eat most of cheese, butter, fat meat, and other sulphureous aliments, and those that are very corpulent and fat themselves, have generally lesser heat in their blood, and a slower circulation and pulse, and are less subject to fevers, than persons that are dry and lean, I mean the bilious. I find that in most chemical fermentations sulphur is far from increasing motion and heat, it rather retards it by involving the saline principles, which are the true cause of fermentation and heat. I consider, likewise, that if there was anything of the nature of a flame in the blood, it would only be in the lungs where it meets the air; but when once it would pass from the lungs into the heart, and into the narrow passages of the veins and arteries, it could no more flame than a lighted candle passed into the deep mouth of a hollow candlestick. Besides, I cannot believe that the air is an aliment to our common flame, no more

than by its pressure and elasticity in keeping and crowding together into a vertex the igneous particles, as I have hinted in the treatise 'De Antris Lethiferis.' For I cannot conceive how the air that comes to the mouth of an oven can serve for a pabulum to the flame which is in the bottom of the oven, for it cannot come near it; so that I am apt to believe that the candle goes out in the air-pump, only because, the air being exhausted, there remains nothing to keep together the flying parts of the candle, and so they soon vanish away; not because there wants a pabulum of air or nitre, since the sulphureous parts of the candle itself are pabulum enough.

From these and several other reasons I have concluded that the intestine motion of the blood is a true fermentation arising from the struggling of its saline parts, and mitigated by its sulphureous ones, like the fermentation of beer, wine, or cider, though in a higher degree. This fermentation causes heat in the blood, this heat expands and rarefies the air that comes in by respiration: the expanded air expands reciprocally the blood, and makes it frothy, thin and florid. So that respiration is indispensably necessary for life, to be a constant cause of the attenuation and subtilization of the blood; though the sulphur of the blood is not supposed by me to be the cause of this heat, yet it is very necessary to bridle and to keep together the saline principles, and to hinder them from evaporating too soon till new ones are supplied by the chyle; so by its pliable and limber oblong particles it wraps up and keeps close together the volatile principles of the blood, that otherwise might fly away. This is, sir, in few words, what I think of this subject, which I submit entirely to your better judgment, contending for nothing else but truth.

Mr. RAY to Dr. HANS SLOANE.

B. N., Jan. 22, —97.

SIR,—I return you most hearty thanks for the medicine you commended to me for the cure of my diarrhœa, which doth indeed effectually stop it *toties quoties*: but I perceive it doth not only stop that flux, but likewise the running of my sores, which renders them very painful in the nights, and causes them rather to spread.

I have now another case to beg your advice in. My daughter Mary, one of the twins, after a long trouble with the chlorosis, is fallen into the jaundice, all the symptoms whereof she hath in a high manner. We have made use of our neighbouring physician Mr. Allen, who first gave her some powders, which, taking no effect, he gave her, I suppose, Riverius, his first medicine for the jaundice, which she hath now taken five days, half a quarter of a pint thrice a day; which, notwithstanding, all the symptoms continue, or rather increase, and she grows faint and feeble. Now, sir, myself and wife (who tenders her very humble service to you) earnestly entreat your counsel and direction how we are to order her, and what remedies you think most proper and effectual for her. I myself was cured of that disease by an infusion of stone-horse dung steeped in ale for a night with a little saffron added, and in the morning strained, and the liquor sweetened with a little sugar. I took about half a pint at a time, and was cured perfectly with twice taking, as I remember. I pray give us your judgment of this medicine. I had given it her before now, but that I was loth to do anything of my own head, physic not being my calling. Be pleased to write a word or two in answer by the next post, for we are very much concerned for the child. I am,

Sir,

Your very affectionate and much obliged
friend and servant,

JOHN RAY.

P.S. Mr. Allen advises the letting of her blood, because, upon blowing of her nose, a little tincture of blood sometimes appears. She is troubled with a short cough, so that my wife is afraid she may be consumptive. She is also troubled with a great heat in the soles of her feet, but this is not new to her, for she had it in summer-time.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Feb. 1, —97.

SIR,—My dear child, for whom I begged your advice, within a day after it was received, became delirious, and at the end of three days died apoplectic, which was to myself and wife a most sore blow. I doubt not but you will commiserate our sad condition.

Nothing afflicts me so much as that I did [not] in time make use of that remedy, which I had proved so effectual to my own relief and cure in the same disease. I am extremely sorry for your spitting of blood, which I humbly pray God deliver you perfectly from. I am not in case to write much, and therefore shall only subscribe myself,

Sir,

Your much obliged friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane, at his house at the corner of Southampton-street, towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., March 2, 1697.

SIR,—I have this morning sent back by carrier the section I last received from you, and entreat you to send me the remainder of the copy, or as much as is ready, for

I intend to apply myself wholly to it, till I have finished it, being desirous to get the work off my hands. For upon this sad accident, and by reason of my growing infirmities, I am well mortified as to natural studies and inquiries, though I shall not, so long as life and strength last, wholly desert them, but make them some part of my parergon and diversion, as I should only have done before. I should be glad to hear of your health and welfare: my wife is full of grief, having not yet been able fully to concoct her passion: she tenders her humble service, and thanks for all your favours, with whom joins,

Sir,

Your affectionate friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane, at his house at the corner of Southampton street, towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., March 16, 1697.

SIR,—I shall now communicate to you a story or two of the direful effects of *Œnanthe aquatica, cicutæ facie succo viroso* of Lobel [*Œnanthe crocata*, Linn.]—which we may English Hemlock Water-dropwort—upon several persons that eat of the roots of it, sent me not long since in a letter from Dr. Francis Vaughan, a learned physician in Ireland, living at Clonmel, in the county of Tipperary. This gentleman observing me, notwithstanding what Dr. Johnson, in his 'Gerardus Emaculatus,' and Lobel, in his 'Adversaria,' had written of the venerose quality of this plant, to be somewhat doubtful of it in my 'Synopsis Methodica Stirpium Britannicarum,' for my full satisfaction and conviction, wrote the following abstract of a

history drawn up by a person, who is at present his brother-in-law, concerning the effects of it upon himself and seven other young men, who ignorantly mistaking it for *Sium aquaticum*, or *Apium palustre*, did eat of it.

"Eight young lads went one afternoon a fishing to a brook in this county, and there meeting with a great parcel of *Œnanthe aquatica succo viroso* (in Irish *Tahow*), they mistook the roots of it for *Sium aquaticum* roots, and did eat a great deal of them. About four or five hours after going home, the eldest of them, who was almost of man's stature, without the least previous appearing disorder or complaint, on a sudden fell down backward, and lay kicking and sprawling on the ground. His countenance soon turned very ghastly, and he foamed at the mouth. Soon after four more were seized the same way, and they all died before morning, not one of them having spoken a word from the moment in which the venenate particles surprised the *genus nervosum*. Of the other three, one run stark mad, but came to his right reason again the next morning. Another had his hair and nails fall off, and the third (who is my brother-in-law) alone escaped without receiving any harm. Whether he eat less of this fatal root, or whether his constitution, which is to this day very athletic, occasioned it, I cannot tell, though I am of opinion that his speedy running about two miles home after that he saw the first young man fall, together with his drinking a very large draught of milk, warm from the cow, in his midway, were of singular use to him. For his violent sweating did doubtless expel and carry off many of the venenose particles, and had a better effect than the best of our alexipharmics (which you know are generally diaphoretic) might have produced in this case. Besides, I believe the draught of warm milk did act its part by involving the acid or acrimonious poisonous particles, and rendering them inactive, and preventing their seizing the *genus nervosum* till they were expelled *per diaphoresin*. But this is but my conjecture, which I willingly submit to more mature judgments. This hap-

pened about thirty years ago; but there are many yet alive who assert the truth of it, having been eye-witnesses of this dreadful tragedy. There was also a Dutchman, about two years [since] within eight miles of this place, poisoned by boiling and eating the tops of this plant shred into his pottage; he was soon after found dead in his boat, and his little Irish boy gave accounts of the cause of his death to be eating this herb, which he forewarned his master against, but in vain, the Dutchman asserting that it was good salad in his country, so that I believe he took it for *Apium palustre*, which its leaves much resemble." Thus far Dr. Vaughan.

Several parallel, and no less tragical histories of later date, of the miserable destruction of divers persons by the eating of the roots of this pernicious and deleterious plant, I find recorded by Jacobus Wepferus, in his book 'De Novis Cicutæ Aquaticæ,' and in the 'Miscellanea Curiosa,' or 'Ephemerides German.' Dec. 2, An. 6, Observ. 116, wherefore I think it is for the interest of mankind that all persons be sufficiently cautioned against venturing to eat of this, and indeed any other unknown herb or root, lest they incur the same fate, and in order thereto that such histories be made public and transmitted to posterity, as what I send you may be by being inserted into the 'Philosophic Transactions,' if you think fit. I am,

Sir,

Your very humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane, at his house at the corner of Southampton street, towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, April 2, —97.

Sir,—Wednesday night last, after I had sent away my letter giving advice of the receipt of the box of sugar, your parcel of submarine plants came. The carrier's excuse for not delivering it together with the box was, that it was put up in a pack which was not then opened. I was no less troubled at this delay or neglect of the carrier, than I knew you would be for fear of the loss or miscarriage of papers of so great concern, and therefore thought it necessary by the first opportunity to send you word of their safe arrival. I shall, with what speed I can, make my excerpta out of them, and remit them to you; and what I borrow out of them I shall do the author right in acknowledging.

Last week Mr. Smith sent me a large Dutch herbal of Abraham Muntingius, of a very fair letter and paper, and beautified with many figures of more rare or nondescript plants. But it will be of little use to me, being written in Dutch, which language I understand not, and because the Latin names are his own, without synonymes or references to any author that hath written of plants. The book hath formerly been printed, but this edition is much larger, and hath more than double the number of sculps. Possibly I may be impertinent in telling you of a book you know much better than myself. This being a busy time, I shall add no more than that I am,

Sir,

Your very affectionate and much obliged friend and humble servant,

Jo. Ray.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, April 13, —97.

Sir,—I do now return the papers you did me the favour to send and grant me the use of. If you have any more ready, be pleased to put them into Mr. Smith's hands, who will take care to send them in the parcel he next dispatches to me; for I would not willingly give you more trouble than needs.

I am very glad you give us any hopes of seeing you here next summer. Though we cannot treat you according to your merit, yet no friends can be more welcome than yourself or any related to you.

I find that if I proceed thus to translate out of your work, my Supplement will swell to a large volume, if, at least, you be so curious and particular in your descriptions of the species of other tribes. But as Pliny saith, "Ut alia bonæ rei ità bonus liberes melior est quisque quo major." And what is borrowed of yours will communicate a great degree of goodness to my book. My wife and girls are well, and send you their humble service, and I am,

Sir,

Your much obliged and affectionate friend and humble servant,

John Ray.

Mr. Ray to Dr. Hans Sloane.

Sir,—I have this morning, by carrier, remitted the tribe of Siliquose Trees, for the use of which I must not neglect to return you merited thanks, and to pray the sending hither the remainder of your copy, which in your last, of March 24, you were pleased to tell me you had quite finished.

About three weeks since I sent up to Mr. Smith the

copy of my Supplement, all but of the Dendrology, which is not yet perfected. Now, sir, I think it were convenient that you revised at least all that is translated out of your Jamaican History, that so you might correct and alter what is mistaken or misunderstood, and supply what is wanting; for I dare not impose such a task upon you as perusing the whole, though, if you would favour me so far as to undertake that trouble, I am sensible it would be much for the advantage of the work. The truth is, I am not in condition to perform this task anything well. Did I live at London, and so had opportunity to view all the gardens about that city, and to describe all species that I should find either not at all but lamely described, and to take more exact notice of all I had not before seen, I might be able much better to judge of names and synonyma, and to render the work more perfect and exact; but with those helps I have I must do as well as I can. Dr. Sherard might have assisted me more than any man, he having seen and collected all the plants now cultivated in Europe. But his dried plants, though the sight of them might afford me much pleasure, yet I should not be able to make use of them in this history without danger of mistakes. Possibly he may return again before the book be quite printed off and published.

Mr. Tournefort's answer to my Dissertation about Methods I should be glad to see before I put out my reformed method, which is almost ready for the press; and therefore if you please to send it you will oblige further him who is already much in arrear to you.

Sir,

Your very humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Dr. VAUGHAN and Dr. WOOD to Mr. RAY.

SIR,—I shall add a few observations concerning the *Tithymalus hibernicus Ascyron supinum villosum palustre*, &c. [*Euphorbia hiberna*, Linn.] I ordered an Irish chirurgeon to make a decoction of the root and a few leaves of the *Tithymalus hibernicus*, but its exhalations were so very acrimonious, that, he holding his head two or three times over the decoction to see how it proceeded, his face and hands were blistered most sadly. Some of the Irish use this root boiled in milk as a cathartic, whose direful effect there was a melancholy instance of, about three years ago, eight miles hence. A brisk young Irishman, who complaining of a dull pain in his left side, which I suppose was an inveterate obstruction of his spleen, a countryman quack of his gave him a dose of the above decoction, which occasioned a violent hypercatharsis, dreadful convulsions, and death before ten o'clock that night; but I believe that an extract might be prepared with the addition of spiritus vitrioli, which might be of excellent use in chronic distempers of robust bodies. I was by your 'Historia Plantarum,' induced to make an extract of *Trifolium paludosum* [*Menyanthes trifoliata*, Linn.], which I found an excellent remedy in *vomitu, imbecillitate ventriculi, cruditatibus acidis, scorbuto, chlorosi*, and question not but that it is an extraordinary universal deobstruent: I have used several pounds of it this last year, and shall make greater use of it for the future. I have also used it as an injection (in sordid ulcers) dissolved in fountain water, and think it has as good mundifying effects as tincture of myrrh and aloes; but then you must dissolve as much of the extract as the water will well contain. I much wonder that the *Ascyron tomentosum palustre* [*Hypericum elodes*, Linn., probably] has not been more taken notice of in physic, for I look upon it to be one of the best balsamic

astringent plants we have; the native Irish call it Birin Yarragh, which signifies *Herba dysenterica*, and use it in that distemper with good success, and I have used it boiled in milk with very good success, *præmissis universalibus*, in *fluore albo*. It is doubtless an excellent vulnerary, and effectual in all fluxes beyond any herb I know.

Clonmel, April 24, 1697.

WORTHY SIR,—As to Insects, I am sorry I have nothing by me worth communicating. I had formerly made several observations on these animalcula, but being forced in the late troubles for England, I left most of what I was worth in Limerick, which place holding out longer than any other part of the kingdom, I there lost most of my books, and, what I esteem more, my papers and manuscripts. At present I have only to say, that I am apt to think there are few plants but if narrowly looked into would be found to produce some kind or other of insect, not by way of equivocal generation, which notion is now as universally as deservedly exploded, but by becoming fit matrices to cherish and mature eggs deposited in or on them. I have lately observed many eggs in the common rush, *Juncus lævis vulg.* [*Juncus conglomeratus*, Linn., and *J. effusus*, Linn.], but I know not yet what animal they produce. One sort are little transparent bodies in shape somewhat like a pear or a retort, lying within the skin, upon or in the medulla, just against a brownish spot on the outside of the rush, which is apparently the cicatrix of the wound made by the fly when she put her eggs there. Another kind I observe, which are much larger and not so transparent, of a long oval or rather cylindrical form; six, eight, or more of these lie commonly together across the rush, parallel to each other, like the teeth of a comb, and are as long as the breadth of the rush. These, sir, are only hints to be farther improved by you, who, being so conversant with plants and

designing a Treatise of Insects, may have opportunity of examining them more accurately. I can see no reason in the fancy of some men who would deduce all distempers from insects, yet I am persuaded they have more share in the production of some than many will imagine. In some sorts of scabs and itch I have seen very small white animals taken out with a needle, and to have been living and very nimble in their motion. These often make visible passages under the skin from scab to scab, like a mole under the earth. Add hereunto animals taken out of the gums, and other parts, mentioned in the 'Philosoph. Transact.' I wish a good account could be given of some animals produced with of others, as the *Lumbrici lati* in men, and of toads found living in the middle of massy stones, &c.

Kilkenny, April 28, 1697.

Mr. Ray to Dr. Hans Sloane.

Black Notley, April 27, —97.

Sir,—I received your letter of April 16th, and on Saturday last the parcel you sent by carrier came safe to my hands. I shall make what haste I can to collect what is wanting in my Supplement, and to return it again. You are still laying new bonds and obligations upon me, which I am always ready to acknowledge and return thanks for, though never likely to requite. In the former papers I found one or two passages which seemed to me somewhat obscure, which I cannot call to mind; if for the future any the like occurs I shall, according to your desire, give you notice of them. I have not seen Mr. Dale since the receipt of your letter, but so soon as I shall, I will communicate to him your pleasure. You have found me work now for a considerable time, so that you are secure of trouble from me for two or three weeks.

I have been and still am troubled with a cold, which disease is epidemical hereabouts. I am,

Sir,

Your most obliged and affectionate friend and servant,

JOHN RAY.

I must not forget my wife's humble service to you.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
next Bloomsbury square, London.

Mr. DOODY to Mr. RAY.

SIR,—Dr. Woodward has shown me slates, wherein there were not only shades of plants, as in the Dendroides, but the real body, and become very hard by imbibing in these stony particles; in one side of the slate a cavity with the impress of the leaf, and on the other side it may be seen prominent, and in both every little lineament so exact, that I could not doubt that they had once grown. I have not seen them very lately, but I intend ere long, and then I shall be able to give you a farther account.

TENTZELIUS to Mr. RAY.

VIR CELEBERRIME,—Biennium est, ex quo controversia agitur inter me et Collegium Medicum Gethanum de prægrandibus ossibus terræ effossis, quæ ego ab Elephanto, Medici autem purè fossile esse contendunt. Epistolam, quam Magliabechio tunc inscripsi, primo statim mense ad illustrem Societatem Regiam misi, unà cum ossium fragmentis, illiusque judicio cuncta subjeci. Verùm non pervenisse ad manus vestras, ex silentio colligo, cùm satìs ex adverso mihi constet, quâ humanitate respondere soleatis Germanis, curiosa vobis dijudicanda offerentibus. Opto igitur, ut hic fasciculus felicior sit, quem curandum

susceperunt fratres Janssonio-Waesbergij, Bibliopolæ Amstelodamenses, cum quibus his nundinis, celeberrimum Ludolfum visitans, notitiam contraxi; iidemque responsum, si quo beare me volueris, huc transmittent. Enimvero ad te scribendi audaciam meam benignè interpretaberis, quæ non solùm ex Synopsi Quadrupedum TUA hinc inde in litteris meis allegata, oritur, verùm etiam ex Rivini Lipsiensis aliorumque exemplo, qui tuo consilio operaque felicitèr usi sunt. Quare spe sustentor optimâ, fore, ut eandem mihi gratiam præstes, et epistolam meam Medicorumque Apologiam inter se et cum fragmentis ossium additis conferas; quorum bina ex dentibus maximis proëminentibus sumta tubulos striasque manifestistimè præbent conspiciendas; tertium ex cranio cùm alias ob causas, tam propterea notabile est, quod continet particulas margæ crassiores ex fluore remanentes et substantiam ossis in lapidem convertentes, eo modo, quem docuit Bootig in epistolâ meâ laudatus. Huc ergo tendit votorum meorum, summa, ut vel tuo solùm, vel illustrissimæ etiam Societatis nomine de totâ controversiâ liberrimè sententiam feras, et quamprimum licuerit, ad me transcribas, cum debito vobis elogio libello meo inserendam, quem Medicorum simul Italorum, Gallorum et Germanorum judiciis exornabo. Denique si vivit adhuc Moulinus, anatomiæ elephantinæ auctor, nihil gratum magis acceptumque mihi foret, quàm ut illi quoque omnia, quæ mitto exhibeantur, eum potissimùm in finem, ut se defendat ab ἐγκλήμασι adversariorum meorum, quasi perperam bestiæ applicuerit terminos anatomicos soli homini proprios. Sed is indubiè habèt fundamenta, quæ censoribus illis opponat. Vale et certus esto me nihil prætermissurum officiorum tibi præstandorum, quod in meâ quidem potestate situm est. Vale iterum Francofurti ad Mœnum, Cal. Maii CIↃIↃCIIC.

Note.—Tentzelius's account of those subterraneous bones is in 'Philos. Transact.' No 234.—W. D[erham].

Mr. Ray to Dr. Hans Sloane.

Black Notley, May 12, —97.

Sir,—I have this week, by carrier, sent back the sections you did me the favour to lend me, which I thought necessary to give you advice of, lest the carrier should be negligent in doing his duty. I am now ready for more, so soon as you shall please to send them. I find them very correct, nor can discover anything that needs amendment. The messenger's haste will permit me to add no more, but that I am, Sir,

Your very affectionate and much obliged friend and servant,

John Ray.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, July 7th, —97.

Sir,—I wrote to you last week, which I hope came to your hands. I have received the parcel you sent Friday last, together with the letter of advice, for which I return thanks. One thing I have to acquaint you with in reference to myself, and to beg your advice. In the beginning of May last, if you remember, there was about a week of extraordinary hot weather, which had such influence upon the sores of my legs (which were then almost wholly dried up and healed, that it altered the nature of them, and turned them into a kind of *heppes* or tetter, which hath spread very much, and encompassed my legs; it was and is still attended with an extraordinary heat and itching. I have used, by the advice of our physician at Braintree, a decoction of litharge, of his own preparing, to bathe

them with to take away the itching; which doth it for a while, but it returns upon me again; and have taken flower of brimstone inwardly, and applied an unguent to the soles of my feet, which, though they mitigate and put a little check to the spreading of the herpes, yet do not, as they say, kill and cure it. At first it issued out a thin humour out of the small pimples, but now there is no visible humour, but only a scurf upon the eruptions. But enough of this. I shall only add the tender of my wife's very humble service, and take leave, resting,

Sir,

Yours in all offices of love and service,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., July 12, —97.

SIR,—Your great kindness expressed as well by the speedy return of answer to my last, as in the solicitousness and concern in your letter discovered for my health and relief, do exact and indeed naturally excite in me suitable affections of love and gratitude. But I thank God, the case is not so ill with me as my letter might give you just reason to suspect. My herpes, for so I will call them, though they are not quite killed, as the vulgar phrase it, and it may be not without reason, yet are they well qualified, the heat and itching much allayed, though I cannot say the spreading quite stopped. I take inwardly flower of sulphur, half a drachm at once, which keeps my body soluble, and gives me a stool or two. Outwardly, I use a decoction of elecampane, dock-root, and chalk, in whey, twice a day bathing the affected places therewith. I do not constantly take sulphur, but

intermit once in two days and sometimes more. Mercury I dare not be bold with. I have formerly taken *mercurius dulcis* inwardly *hora somni*. After taking it I slept about two hours and then waked, sleeping no more all night; in the morning it began to purge me, and so continued for the most part of the day. And, lest I should take *non causam pro causa*, I reiterated the expement three times, with the best prepared mercury, and always with the like effect. The *emplastrum de ranis* I also applied, with no better success. For two years after I had good reason to think that the mercury was not quite out of my body, and yet found no effect of drying or healing my sores. I am now come to a suspicion that these tumours are owing to insects making their burrows under the cuticula; their juice mingling with the serum of the blood causes an ebullition, and excites the tumours, pustules, inflammation, and itching. But this I propose only as a conjecture, though I could bring probable arguments to confirm it.

Your advice about letting blood I approve of, and had it been given earlier in the year I should have taken it. My blood is hot, and adust when I have been let blood, which hath not been often; it was always of a very dark or blackish colour. I hope the method I am in will in time quite cure me, though I do not much delight in sulphur, nor indeed any strong medicine. You would not think what effects opium hath more than once had upon me; instead of pacifying and stopping the ebullition or orgasmus of the blood, or giving rest, hath put it into such a rage and so inflamed me, that I got not well of a month after, whereas before I had little fever upon me. But I will tell you my reverie in relation to sulphur. You know the fume of it inflamed kills all manner of insects of a sudden, though they be not near the flame, or at all scorched with it. You know what a twinge it gives a man that holds his nose near the fume of it. Now I fancy that, taken into the blood, it may be heated to that degree as to emit a fume sufficient to kill or destroy

the insects lodged in the tumours. But enough of this. My wife and girls are very much yours, and so is,

Sir,

Your affectionate friend and most humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, July 15, —97.

SIR,—I gave you no advice of the receipt of your Graminifolious tribe, because I had written word thereof to Mr. Smith, and presumed he would acquaint you therewith. I now remit it to you, attended with my hearty thanks, and pray the loan of the next section. I thought it not necessary to direct to Mr. Smith, but have done it immediately to yourself, and hope it will safely come to your hands, having bidden the messenger to lay a strict charge upon the carrier to take great care of it. I am not yet fully satisfied with your change of opinion concerning the *Milium indicum arundinaceum*, &c., that it is different from the *Sorgum* or *Melica* of the Italians. For not only Caspar Bauhine's description of the *Sorgum* agrees with yours of the *Milium indicum*, but to the best of my memory the plant itself, which I saw cultivated in Italy, answers your description. But it is a great while ago since I saw the plant, and have no dried specimens of it, and so may be mistaken. I did indeed take *Frumentum indicum quod Milium indicum vocant*, C. B., to be a species distinct from *sorgum*; but we have no clear knowledge of that. Hermans makes his *Milium indicum arundinaceo caule*, &c. to be a distinct plant from *Sorgum*, and one would think could not be therein mistaken, having, as I presume from his inserting both in his Catalogue, cultivated both in his physic garden. If you have

seen *Sorgum* cultivated, or have specimens of it, I must yield to you. Your two genera of *Gramen dactylon* and new genus of *Juncus cyperoides* I do very much approve, as well observed by you. My wife salutes you with the tender of her very humble service, and I am,

Sir,

Yours in all offices of love and service,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., July 19, —97.

SIR,—These are to acquaint you that I intend next Wednesday to send back your Stamineous tribe. I had within a little finished it last week. Wednesday a young German doctor gave me a visit, known to you better than myself, for he told me he had been with and received several things of you. He draws insects, as far as I am able to judge, exceeding well. He stayed at Braintree two days, which time he spent in drawing several *Papilios* and *Phalænæ*, some of Mr. Dale's and some of mine. He hath seen and delineated all the *Papilios* of England known to me, about forty species, and assures that the most of them are common to Germany with us, and that Sibylla Myrion to his knowledge hath drawn none of them but what we also have. He seems to be very ingenious and communicative, and, were I but ready with my History of English Insects, might be of great use. But alas! I have not gone through one tribe, that of butterflies nocturnal and diurnal; nor, should I live ten years longer, were I like to come to any near prospect of the end of it, should I pursue it with that diligence and application I have done now these seven years. What then shall

I say of the other tribes of *Scarabæi* and flies, which are as numerous as they. You would not imagine how much time it takes one to search out and to feed them, I mean the *Erucæ*.

My legs continue much in the same state they were, the ulcuscula almost healed, but the tetter rather spreads. I have not as yet made use of mercury, which, if other medicines fail, I shall make trial of, but outwardly. My wife gives you her very humble service. I am,

Sir,

Yours in all offices of love and service,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., Aug. 3, 1697.

SIR,—I have this morning sent back by carrier the tribe of plants with a monopetalous flower, which I last received, and which I hope will come safe to your hands, and it may be before this letter. I find nothing in it as to the matter that needs correction so far as my skill extends, but am wholly your scholar as to exotics which I never saw. Some few things I meet with in the language and expression which I do not clearly understand, which yet I suppose is to be attributed to my slowness of apprehension and incapacity, which therefore I thought it not worth while to note. My herpes continue in *statu quo*, neither sensibly mending nor impairing. I could wish I had some safe and effectual medicine to kill, as our people hereabout not improperly term it, or, if you please, cure, these tetters before winter. Mercury I should venture upon using, but that I find it takes away my rest. Last week I anointed the soles of my feet with an unguent, prepared by our physician Mr. Allen, in which I

suspect there was something of mercury, though he told me not so, for upon using of it, after about two hours rest, I waked and could sleep no more all night; in the morning it gave me a stool, and caused a motion in my belly all day. I shall take leave when I have told you that my wife salutes you with the tender of her humble services, and that I am, Sir,

Your very affectionate and much obliged friend and servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Sept. 10, [illegible]—97.

SIR,—I received your letter of Sept. 2d, and, in expectation of the papers you therein signified you intended to send me, I dispatched a messenger to Braintree to inquire at the carrier's if they had not a parcel for me, but they all told him they had none, whereupon I thought fit to give you advice thereof, both for mine and your own satisfaction, that if they were sent and be in the carrier's hands I may make more diligent search after them. If so, I fear not much the loss of them, having never as yet had anything lost that was delivered to any of them; if not, I may be put out of all trouble and disquiet about them by a line or two from you.

I am, sir,

Your much obliged friend and servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

B. N., Oct. 29, —97.

Sir,—I have this morning by carrier remitted the two tribes of Jamaica plants you last sent. Mr. Smith in his letter to me made no mention of his detaining them. He sent me together with them a book in folio of the description and figures of the more rare plants of the physic garden of Amsterdam, which I suppose you have by this time perused. Some plants I there find discovered also and described by you. I hope now you will hasten the edition of your Natural History of Jamaica, &c., that it may be published before my Supplement be finished, which then may neither defraud you of the honour of the first publication, nor hinder but rather advantage the sale of the book. So with the tender of my wife's humble service, I take leave and rest,

Sir,

Your obliged friend and humble servant,

John Ray.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

B. N., Oct. 13, —97.

Sir,—I have this morning, by carrier, remitted the three tribes you were pleased to send me a fortnight since, and am now ready for more. In the 'Horti Med. Amst. rar. Descriptio et Icones,' lately sent me by Mr. Smith, I find some plants of your observation, and others besides there may be which I have not taken notice of. I am informed by Dr. Robinson that Dr. Woodward hath lately affronted and abused you before the R. S. I wonder

what occasion he could find for so doing. By all I hear of him, he is a rude and insolent fellow. My wife salutes you with the tender of her humble service. I am,

Sir,

Your very affectionate and obliged friend and servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

SIR,—I have this morning returned you by carrier the three tribes you last sent, and give you many thanks for the use of them, as also for your kind and friendly letter. Mr. Harris's book I gat not till yesterday. I have hastily perused it, and find it to be a scurrilous piece, wherein the author hath discovered a great deal of pride, scornfulness, and ill-nature; besides his rashness, inconsiderateness, and maliciousness in injuriously attributing to Dr. Robinson pieces of which he was so far from being the author, that he knew not who was. As for his treating me, though it be not very civil, yet it is not so vilely rude and contemptuous as might have been expected from a person of whom you have given so just a character. And now, sir, since you command me to find faults in your writings, and I have nothing to carp at but grammatical niceties, and because I see Mr. Harris hath exercised his pedantic critics upon that subject, give me leave to acquaint you with one orparoramata, or perchance only typographical errata of that nature. 'Cat. Jamaic.' p. 16, l. 9; "Ex insula Jamaica adduxit," &c., for brought. This, I remember, was many years ago derided by Mr. Hobbes for improper. But the Oxford Professors, in whose writings he found "adduxit secum malleum," which he interpreted, lead with him a hammer, and upbraided

them with, spent two or three pages in justifying it by parallel examples brought out of good authors. P. 18, l. 6; after "communicata" there seems to want "erat," or else it must be "communicabatur." P. 120, l. 1; "innascere" seems to be put for "innasci." I told you formerly that some passages or clauses I did not well understand; but I noted them not, because they were not very material. Your work I cannot but highly approve of, and do account it the greatest ornament, and, indeed, most valuable part of my Supplement, and you shall not fail of having right done you in the publication of it. The inclosed be pleased to despatch away to Dr. Preston, who ordered me to recommend it to your care. My wife salutes you with the tender of her humble service, and I am, Sir,

Your much obliged friend and humble servant,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house, at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, December 7, —97.

SIR,—It is now a fortnight since I sent you the two last tribes I received, viz. the last of herbs, and first of trees, which I hope are come safe to your hands. I was in hopes you would have sent me some more, though it be no great matter as yet, for the weather hath for some time been, and continues still to be, so sharp, that it hath cast me into a diarrhœa, and rendered me very listless to prosecute any studies. It is a distemper that usually attends me in very cold weather, proceeding, I guess, from the relaxation of the tonus of the bowels. I was wont to cure myself with a Naples biscuit, boiled in milk, a safe and pleasant medicine; but this year it hath not its usual effect upon me. I hope your lady is perfectly

recovered and in health, which I mention, because I am not without some fear that her illness may be some occasion of your deferring to send me a further part of your history.

Now, sir, since you are pleased to take so kindly my advising you of some oversights or typographical errata in your Catalogue, I shall add two or three more; though in the mean time I must and do acknowledge that I meet with very few books so well correct as that; I am sure there are none of mine but have twice as many errors, partly owing to mine own ignorance or oversight; for through inadvertency I do often commit mistakes in things that I know, did I but heed, tanquam ungues digitosque, partly to the compositors at the printing-house. P. 129, l. 12; *for* "inredible" I suppose it to be read "inremediable;" l. 27, *for* "illinita" *read* "illita," and in the same line, *for* "pericutietur," "percutietur." P. 138, lines 31, 33, and 35; *for* "Zanthoxylon" *read* "Xanthoxylon." Though here you do but copy your author, and the mistake be his; yet you might be so kind to him as to correct it, and lest the reader, being ignorant thereof, may attribute it to you. But enough at present. My wife salutes you with the tender of her humble service, and I am,

Sir,

Your affectionate friend and obliged servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane, at his house at the corner of Southampton street, towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., November 17, —97.

SIR,—Your last papers, containing the herbs, with a compound flower and first tribe of trees, being not sent by the carrier formerly employed, I received not till

yesterday. The weather sets in very sharp sooner than is usual, so that I cannot bear long absence from the fireside, and so cannot proceed so fast as otherwise I might.

I am bold to trouble you with the inclosed to Dr. Sherard, because I know not his address. It is to tell him that I do thankfully embrace his kind offer made me to accept. But now that he hath promised to ease me of a great part of the labour by digesting his plants into the method of my history, and communicating his own notes and observations concerning them, I could not be such an enemy to the perfection of my work as to refuse so advantageous an offer, which will give it its utmost complement, and render it as full as it is hitherto capable of being made, wanting but very few species that have hitherto been discovered in or brought into Europe out of the other parts of the world.

I am, sir,
Your obliged friend and humble servant,
JOHN RAY.

For his honoured friend, Dr. Hans Sloane, at his house at the corner of Southampton street, towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Jan. 17, —98.

SIR,—Last week I sent to Mr. Petiver a small parcel, and therein inclosed a sheet of excerpta, out of Signior Boccone's second book, which I desired him to send to you, which I hope he hath done. I am sensible that the language and writing is rude and slovenly, and therefore beg your excuse for my slothfulness in drawing up and suffering such a paper to go out of my hands, and confidence in exposing it to your view. But I suppose you will suppress it, and let it go no further.

I remitted to Mr. Petiver Father Kamelli's papers of figures and descriptions, some of which, I think, deserve

to be published in the 'Philosophic Transactions,' viz.— De Tugus seu Amomo legitimo; De Contrayerva seu Doso; De Mananangtang seu Arbore corticis emetici.

I have now run over your books, and if you desire or stand in need of them, will send them back; my only reason for detaining them is, that if Mr. Smith will print my Supplement, I may collect out of them what species are therein wanting, and insert them in the copy, which must be sent back to me. Wife and daughter give you their humble services by the hand of,

Sir,

Your very affectionate and much obliged friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane, at his house at the corner of Southampton street, towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley. March 1, —98.

SIR,—I have received yours of Feb. 29, and do return you many thanks for the care and pains you have taken about my concerns. As to my Supplement, I have written to Mr. Smith to return me a speedy answer either affirmative or negative to this question, whether he will undertake the publishing this work this summer, and to begin it this next May or no. According as his answer is, so I shall proceed to act; whether it may sell or not, I know not. It takes in a great deal. The last six volumes of the 'Hort. Malab.' entire; all Father Plumier's work; all Dr. Plukenet's; Dr. Herman's 'Paradisus Batavus;' Sig. Boccone's 'Museum Plantarum;' Commelin's more Rare Plants of the Amsterdam Garden; besides collections out of many other books, and descriptions of dried plants. But what will most recommend it to the reader, and give

it greatest advantage of sale, is such a multitude of rare plants not yet described by any, as your 'History of Jamaica' contains. But still it is but a blind work, not illustrated by any figures, and so useless almost to any but great proficients in botanics, and I am sensible that there must needs have crept in a multitude of mistakes, I having seen none almost of the species, and of a great part having only a name or title, with a few epithets. Your collection of Maryland plants I am desirous to add to this work, and at your best leisure and convenience pray you to send them down hither, together with the copy of my Supplement, to which I shall add Herman's 'Parad. Bat.,' and Boccone's 'Museum Rariorum,' which I have already almost transcribed into papers, to lie in their proper places inserted into my Supplement. The Maryland plants I desire your opinion concerning, whether I shall dispose them in the Supplement under heads, or put them in an alphabet by themselves. I shall make but poor work with them myself, and therefore hope you have carefully reviewed them, and put down your judgment of each.

My sores continue still to be very painful and troublesome, especially in the night. Little hopes of amendment this winter. I am sensible of my obligation to you in being so solicitous concerning my health. I thank God I have a tolerable measure of ease in the daytime, so that I am able to do somewhat, yet scarce ever quite free from pain. Myself and relatives remember you as oft as we taste the effects of your kindness, and that is almost daily. I do not say we drink your health, but we pray for it.

I am, sir,

Your most affectionate friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

B. N., April 13, —98.

Sir,—I received yours of April the 7th by Friday's post, and by carrier the parcel therein mentioned, containing two tribes of trees, and Mons. Tournefort's book; which I shall more carefully peruse and consider. The copy of my Supplement being ready for the press, I put it into Mr. Smith's hands, because at his instance I drew it up, and he hath furnished me with books all along for carrying it on. So that it is his, and I am but his journeyman or operator. But yet had I known that there were any so ill-natured persons as to wish ill to you and your doings, I should have cautioned him not to show it to anybody but such as I should order him. Indeed I have given him commission to show it none but yourself and Dr. Robinson, with whom I hope you stand right. He is the person to whom I am beholden for my knowledge of you and acquaintance with you, and hath not long since in his letters to me commended your 'Jamaica Catalogue.' None hath as yet seen or shall see any of your papers, so long as they are in my hands. I have not seen Mr. Dale since the receipt of your letter, but when I do, I shall desire of him a sight of the *Medicina curiosa*. My wife gives you her very humble service. We all are indifferently well, as I hope yourself and whole family also are. So I take leave, and rest,

Sir,

Yours in all offices of love and service,

John Ray.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, April 27, —98.

Sir,—I have been so interrupted and disturbed lately, that I have not been able to finish the two tribes you last sent me. I presume Mons. Gundeleschmir since his return to London hath acquainted you that he hath been with me. He endeavoured to excuse Mons. Tournefort, and to vindicate him from the imputation of rudeness and incivility in his treating of me in his 'Elém. Botaniq.' wherewith he hath been charged. I can easily pass it by, because he hath treated me no worse than I deserve. But truly his method, considering it with all the indifference I can, seems to me faulty and liable to many exceptions; and as for what he hath written against my 'Dissertation,' it admits in most particulars of an easy answer, as I may afterwards show. I own him to be a skillful herbarist, and had he let me alone I should not have opposed his method, but permitted every one his freedom to embrace and follow what seemed best to him; only I might have corrected the errors of mine own, as many as I knew of, and set it in as good a light as I could. I hope you will, I do not say take the liberty, but do me the favour to correct whatever you find amiss in my Supplement, and to add, cut off, and alter whatever you observe to be deficient, redundant, and incongruous, or erroneous. I remember I was in some places doubtful about your meaning, and therefore probably might mistake it.

My wife presents her humble service to you, and we both many thanks for your intended present of sugar, which we can hardly without violation of modesty receive at your hands. You do *beneficia beneficiis cumulare*, and even load us with your kindness. I cease to give you further trouble, and rest, Sir,

Your very affectionate friend and humble servant,

John Ray.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, May 13, —98.

Sir,—Lest you should be doubtful and solicitous about the safe conveyance of your last papers, I thought it necessary to acquaint you that I received them on Sunday last, and should have made some progress in them, had I not been busied in writing an answer to a letter I lately received from Dr. Hotton, professor of physic and botanics in Leyden. Whereas you desire my opinion of your history when I shall have finished the reading of it. I need not defer so long to give you it, for the end I know is answerable to the beginning and middle, and the whole, to speak impartially, without being biassed or influenced by interest or affection, though I cannot truly say with the historian *Quorum causas procul habeo;* the whole I think to be an excellent work, and of great use to the ingenious and inquisitive, nay, to those that have but a smattering in botanics, and even to the vulgar themselves; containing many instructive remarks and observations concerning the nature and uses of many plants, culinary, medicinal, and mechanical, not to mention others that are chiefly luciferous. But enough of this, and perhaps though true more than your modesty can well bear. In my dealings with Mr. Smith I shall chiefly be governed by yours and Dr. Robinson's advice; I think I have formerly acquainted you how far I have been obliged by him, and therefore would willingly deal friendly and ingenuously with him, having no reason to the contrary, excepting the deferring the publication of my Synopsis Avium and Piscium, of which the reason he pretends is his distrust of the sale of it. But I am now in some haste, and therefore shall at present take leave, resting,

Sir,

Your very affectionate friend and humble servant,

John Ray.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, June 1, —98.

Sir,—I have this day returned the last three sections of your work, for the use whereof, as of all the rest, I render you many thanks. I told you in my last what an opinion I had and .... of it, acknowledging it to be the greatest treasure and ornament of my Supplement, and which will chiefly recommend it to the curious and learned reader. I have not now time to write what I can truly say in commendation of it without flattery ... though perhaps not without suspicion of it. The messenger [is] waiting for my letter. My wife hath lately been very [ill], but is now, I thank God, much better. One of my daughters, twin-sister to her that died, is inclining to the same disease, that is the jaundice, for whom I need not pray your advice, because I had it formerly for her sister, though too late. I take leave, and rest,

Sir,

Yours in all offices of love and service,

John Ray.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

B. N., June 28, —98.

Sir,—Looking over some papers, I found among them two leaves of your Jamaica History, which were scattered out and mislaid, which I have sent you herein inclosed.

Your last three tribes I returned, and hope they are come safe to your hands, though you have not been pleased to give me advice of it. I wonder that I have not of a long time heard anything of or from Dr. Preston. I have some papers of dried plants of his in my hands, which I would willingly remit, if I had but order from him whither I should send them. My other twin-daughter, as I think I hinted to you before, hath been very ill of the same disease of which her sister died. I thank God she is now in a hopeful way of recovery, though not out of all danger. We have plied her with chalybeate medicines, judging her disease to be complicated of the jaundice and chlorosis. My wife tenders her very humble service to you; and I am no less,

Sir,

Yours in all offices of love and service,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

SIR,—My Supplement to the Dendrology, being in a manner wholly yours, I have this morning sent you up by carrier, and been bold also to put the charge of carriage upon you, for the better security of conveyance. I entreat your pains in correcting what is erroneous or mistaken in supplying what is wanting, in altering and amending what is obscurely delivered, or not well expressed, and whatever other faults of any kind you shall find therein.

I am at present in evil case, the sores upon my legs spreading and increasing, and growing very deep many

of them, and running extremely, being also so painful that they do very much hinder my rest; and sometimes the heat and itching is so violent, that they force me to quit my bed. I have not as yet hit upon anything which affords me relief. I do now take these sores to be ill-conditioned herpeses, and to proceed from invisible insects nestling in the cutis, and these making *cuniculi*, and spreading from place to place; for about the sores are many red but flat-headed tumours or spots, some greater, some less, which may be the nests of these insects (like ant-hills), they seeming to be gregarious; but all this is only conjectural.

My girl, I thank God, is perfectly recovered of the jaundice, and hath been for some time. I know not but that I might acquaint you therewith in my last. For some time (about three weeks) before she was perfectly clear of the disease there fell an humour into her legs and feet, which swelled them, and made her so lame, especially in the afternoon and at night, that she was not able to walk. These tumours were taken down and discussed by a poultice of oatmeal, upon which a little barrow-hog's grease was spread, and that in two or three times using, which was advised by a gentleman who came to visit us accidentally.

But enough of these impertinencies; the remainder is, my wife's very humble service to you, and that I am,

Sir,

Your affectionate friend, and humble servant,

JOHN RAY.

B. N., August 10, —98.

Mr. Ray to Dr. Hans Sloane.

Black Notley, August 19, —98.

Sir,—I am much obliged to you for your condolence with me, for truly I am but in evil case, partly with itching, and partly with smarting, which are most grievous in the night, keeping me waking very often many hours together. One while I took these eruptions to have been pernios, but now am returned to my first opinion, that they are herpeses, but *mali moris*, and suspect that they may be occasioned by nests of insects harbouring under the cuticula, and making *cuniculi*, and so spreading from place to place; for round every sore there are small red *tumusculi*, flat, and bigger near the sore, which I conjecture to be the nests or swarms of those insects. The news of the sickness of that sweet lady, the only daughter of my ever honoured friend, Mr. Fr. Willughby, would have been very sad and bitter to me had it terminated in death; but since, through the Divine blessing upon your endeavours, she is recovered of it, the more dangerous her condition was, the greater subject of joy and eucharist it is to me.

Your botanic books, if you please to afford me a sight of them, if I be in case, I shall gladly peruse and make some excerpt out of them. Dr. Hobbs's ointment you mention, I fancy would be the most likely thing in the world to afford relief in my case, but I am not able to bear mercury: it will by no means agree with my temper, however taken or applied. I am so drowsy that I can scarce hold my pen, or know what I write, and therefore it is time to take leave. I am, sir,

Yours in all service,
John Ray.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, October 26, —98.

Sir,—I want words to express the sense I have of your extraordinary and unmerited kindness, in making us so many noble and rich presents. Sincere gratitude, and a ready owning and professing my obligations to you, is all the amends you are to expect from a person in so mean circumstances, not for want of will, but ability, to requite. My wife is very much taken with the quality, as well as quantity, of your largess, the fineness and fatness of the sugar. She returns you her very humble service and thanks, and so do my girls.

The sores upon my legs continue still very painful and troublesome, with little intermission, night and day. I have not yet made use of your advice; indeed I thought it not safe to do so without first cutting issues to carry off the humour; and I desire your opinion whether you think it safe or advisable to dry up the sores without making some provision to drain the blood of the humour that used to be evacuated that way.

Dr. Preston's dried plants I shall take care to send up whithersoever he shall direct, so soon as I shall receive orders from him. I should be glad of any of his observations relating to the method of plants, in which he is very knowing and curious.

I should be glad to see Monsieur Tournefort's Latin edition of his 'Botanic Elements,' which I cannot but wonder he defers thus long.

I hear of several new botanic pieces come over, viz. of Paul Herman, Signor Boccone, &c,

I have lately received a letter from Father Camelli, a Jesuit, living at Manilla, in the Philippine Islands, with some draughts and descriptions of plants growing there, of which, I suppose, Mr. Petiver hath given you an account.

I cannot take leave without telling you that I dare not own anything of worth in myself meriting respect from any man, but the less I deserve it, the more I am obliged to them that give it, but especially you, sir, who must needs see through me, and discern how mean my skill is in anything, and must therefore therein be partial to,

Sir,

Your most affectionate friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, November 2, —98.

SIR,—I thank you for your last kind letter, wherein you so frankly offer me the sight and perusal of Dr. Herman's 'Paradisus Batavus,' and Signor Boccone's late pieces, which I do gratefully accept, and desire you would do me the favour to send me them so soon as conveniently you can. I shall be careful to return them again so soon as I have done with them, and that shall not be long.

Since my last to you, I have been sadly afflicted with a diarrhœa, which I hope is for the present stopped. I have, according to your direction, made use of diascordium, which hath several times given me relief; but my small stock being spent, sending to our shops they sent me pitiful slop, which had neither the colour, consistency, taste, nor, I believe, virtues of diascordium; so I made use of conserve of roses inwardly, and outwardly applied, as hot as I could endure them, little cakes made of powdered chalk with the white of an egg, to my belly, *circa umbilici regionem*, drinking burnt claret, which I think

stop the lash. though I may possibly mistake *non causum pro causa*. The sores upon my legs are at present very painful and troublesome. Now that the weather is come to be open, I intend to have issues cut, which I hope will deliver me from this misery I labour under, else *vita minime vitalis esset*. My wife and daughter tender their humble services by the hand of,

Sir,

Your most affectionate friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, November 16, —98.

SIR,—Last week I received the parcel of books you were pleased to send me, together with a pot of diascordium, for both which I return you thanks. As for the latter, I know not how to excuse myself from the imputation of impudence in writing so as you might interpret it a begging; yet you should not so far have complied with me as to have put yourself to the charge and trouble of sending me a pot, but rather have governed yourself by that proverb, "A bold beggar must have a bold nay-say." By Dr. Herman's 'Paradisus Batavus' I have learned several things which may be of use to me, both in my 'Supplement' and 'Methodus Plantarum.'

I doubt not but Mr. Petiver hath long since acquainted you that Father Camelli, a Jesuit, in Manilla, hath sent me some designs and descriptions of plants growing in the Philippine Islands, together with a letter, wherein he writes that he hath in like manner designed and described above 300. He seems to be well skilled in botanics. He is a German by nation, native of Brin, in

Moravia. His papers must be sent back again with mine and the Society's opinion of them, and exceptions against them. Mr. Petiver is of opinion that it would be well done, if the Society approve it, to print them in the 'Philosophical Transactions,' because possibly they may else be lost, which I refer to you and them.

I have an issue cut on each leg, which now begin to run, but yet afford me no relief, my sores being as painful and troublesome as ever. The weather falls out so vehemently cold, that I dare not as yet go about to dry them up. I am but uneasy at this instant, and therefore take leave, resting,

Sir,

Your very affectionate and much obliged
friend and servant,
JOHN RAY.

I should have desired your opinion concerning Dr. Colbatch's hypothesis. I have read his books, and must confess that I am inclinable to it, though it be directly contrary to the received.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., December 14, —98.

SIR,—I have hastily scribbled something concerning Dr. Herman's 'Paradisus,' which, if it may serve your turn, I have my end; if not, there is not much time lost. In your last you did not give me your opinion concerning Dr. Colbatch's hypothesis, nor touch anything concerning Father Camelli's figures and descriptions of *Amomum contrayeron* and other plants; I am still full of pain and

trouble, my issues giving me no relief. The *lapis medicamentosus* is too sharp for me. Myself and mine are,

Sir,

Very much yours,

JOHN RAY.

Paradisus Batavus, continens plus Centum Plantes, &c.

The learned and much celebrated herbarist, Dr. Paul Herman, author of this work, whose name alone is sufficient to recommend it to the ingenious reader, designed therein to give us the history of such rare and nondescript plants, as well European as Indian, as were cultivated either in public physic-gardens, or those of private curious persons, in and about Holland, as we see now accordingly performed. Of some of these he presents us with both descriptions and figures; of others with descriptions only; and of others which had been before described, but not delineated, with figures, referring us for their descriptions to their first authors. Of the first kind, this work contains more than 100 species, digested in an alphabetical order. The author intended a second and third century, for which he had prepared materials, having caused many more plants to be drawn by hand, which are not as yet engraven, a catalogue whereof the editor hath added to the end of the book, which it were to be desired some public-spirited persons or societies would be at the charge of cutting in brass, that so great a treasure be not wholly suppressed and lost.

All that I shall or need say of this piece is, that the descriptions are very accurate, and sufficient alone to lead us into a certain and unerring knowledge of the plants described, and withal concise, and not encumbered with superfluous and unnecessary stuff, which obscures rather than illustrates; and that the icones are answerable to the descriptions, not needing their assistance to give us a certain idea of the species they represent; to

which I may add, that they are so exactly delineated, and curiously engraven, that for their elegancy alone they may invite the curious in sculpture to purchase the book.

But, besides the subject of the work, that is, the descriptions of the more rare plants therein contained, the author gives us some remarkable observations by the by, as p. 19, &c. An exact division of mallows, or malvaceous plants, which he distinguishes into two kinds. 1. Such as bear naked seeds. 2. Such as bear seeds inclosed in cases or vessels. To this last kind he appropriates the name of *Althæa*, referring the common *Althæa* of the shops to *Malva* strictly so called. I think it had been more proper, to avoid confusion and mistake, to have left in quiet possession of the name *Althæa* the plant on which it was imposed by the ancients, by which that plant is denoted in all the writings of herbarists and physicians, ancient and modern, and imposed a new name on the Indian Mallow [*Hibiscus*, Linn.], as M. Tournefort hath done, viz. *Ketmia*. Such as bear naked seeds he divides into *Malvæ*, in specie so called, and *Alceæ*. The notes of *Malva* he constitutes many naked semilunary seeds, disposed in the form of a rundle or placenta, a double calyx divided into eight segments, or more, as it were into so many leaves. Flowers made up of five leaves or petala joined at the bottom, and a style in the middle, furnished with many apices; or, instead of such style, made up of many leaves. Simple leaves, alternately situate, either roundish or oblong, either entire and undivided, or divided, but not deeply. Those called by the name of *Alcea* are, he saith, of two kinds. Those of the first kind agree in their principal parts with Mallows [*Malva*], only their stalks and leaves are somewhat more rough, and these divided into narrower and deeper lacineæ, or jags. Their flowers have no petala in the middle, but a style with many apices, proceeding sometimes singly, sometimes many together, out of the bosoms of the leaves. Those of the latter kind have naked triangular seeds, five for the most part, rarely more or fewer, close joined together

into a head, either of a smooth surface, or echinated after the manner of *Xanthium*. Their calyces are divided into five segments, their flowers like those of the precedent kind, but less; their leaves either entire, only nicked in the edges, resembling the leaves of hornbeam, elm, or mulberry, or divided less or more deeply into lobes. Those of the second kind, or Indian Mallows, which he calls by the name of *Althææ*, bring forth seeds, either angulose or round, in vessels divided into five cells, more or fewer, of different form and magnitude, having malvaceous flowers and calyces, leaves alternately situate, some whole, some divided into lobes, some deeply laciniated.

Another remark he gives us concerning the plants called by the distinct names of *Apocyna*, or Dogsbane, *Asclepiases*, or Swallow-worts, and *Neria*, or Rosebays, which three he reduces to one kind: the characteristic whereof he makes *Siliquæ*, or cods of one piece, opening longways, and containing seeds piled one upon another *imbricatim*, each having a long appendant filament of down. For, whereas some make the difference between these to be, that the Swallow-worts have single cods succeeding each flower, but the Dogsbanes and *Nerias*, or Rosebays, double, and that the *Neria* are shrubby, or arborescent plants, containing a limpid, or yellowish juice, whereas the *Apocyna* yield a milk. He shows that these notes are not proper to one kind, but agree promiscuously to all the rest; for sometimes the Swallow-worts bear single cods (he might have said always, according to the intention of nature), and on times solitary or single. Neither doth *Neria* only grow up to the magnitude and stature of a tree, or contain a limpid yellow juice, but also some sorts of *Apocyna*. Neither doth Swallow-wort only yield a limpid watery juice, but [some] sorts of *Apocyna* also. Besides, though this juice in Swallow-wort be limpid in the beginning of summer, yet towards autumn it grows thick and m . . . , as Fab. Columna hath observed. Of these *Apocyna*, which

are very nu[mer]ous, he gives us a catalogue, containing both those observed by himself, and those described by others, which he distinguishes into two kinds: 1. Erect. 2. Scandent. 3. He gives us an enumeration of such plants as may be comprehended [under] the general name of *Aron*, the characteristic whereof he makes to be a Ba[tavian] plant, having a monopetalous cucullate flower, whereof there are fo... sorts, called by the name of *Aron*, *Arisarum*, *Dracontium*, and *Colocasia*. *Arisarum* differs from *Aron* in being less and slenderer in all its parts. *Colocasia* from both, in having smooth, umbilicate leaves, without any spots. 1. Footstalk inserted not in the end, but in the middle of the leaf, after the manner of the Cotyledones; flowers sometimes single, sometimes more than one proceeding out of the same folliculate footstalk, a style thicker and shorter than *Aron*, and terminating in a slender point. *Dracontium* differs from *Aron* and the rest, in having a leaf deeply laciniated or divided into many jaggs.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Museo di Plante rare della Sicilia, Malta, Corsica, Italia, Piemonte e Germania, &c. di Don Paolo Boccone, &c.

The learned and ingenious author of this work, Signor Paolo Boccone, a gentleman of Sicily, botanist to the great Duke of Tuscany, and now a monk of the Cistercian order, of the province of Sicily, having changed his prænomen into Sylvius, hath rendered himself well known to the learned world by his writings published many years since, viz. his 'Icones et Descriptiones Variorum Plantarum Siciliæ, Melitæ, Galliæ, and Italiæ,' printed at Oxford in the year 1674. And his letters

about several natural curiosities, which he entitles 'Recherches et Observations Naturelles,' Paris, 1671; Amsterdam, 1674; and 'Recherches et Observationes Curieuses,' Paris, 1671, written in French, and printed at Amsterdam. In this present work he gives us a large collection of rare plants, the greatest part whereof are new and nondescript, curiously delineated and engraven in 130 octavo plates, which he divides into decades, inscribing each decade to a Venetian nobleman. Two defects there are in this work; the one want of method, the other of descriptions. 1. As for method, there is none at all observed in it, the species being promiscuously and indiscreetly placed as they came to hand, without any order or connexion. 2. Besides the names, the stature, and magnitude, the places where he found them, or the persons from whom he received them, he hath to a great number of these plants added no descriptions of the principal parts, root, stalks, leaf, flower, fruit. This though he endeavours to excuse, p. 171, by telling us that he writes to such as are advanced in the knowledge of botanics, who need no long descriptions, and to whom they would be rather tedious than useful, and not to novices, yet can he not easily persuade us but that concise exact descriptions would ease the greatest proficients of much trouble in finding out and exactly determining the species. He had also obliged us if he had given us the synonyms of such as he took to have been described by others before him, together with the names of the authors of such synonyms and descriptions. This also he endeavours to excuse by want of time and books. Yet all this notwithstanding we ought rather thankfully to accept what he hath done, by enriching the history of plants with such a multitude of new species, than to censure or reprehend him for what we apprehend he hath omitted, which he might have done.

Besides this main subject of this work, the author intermixes many curious observations and remarks, physiological and medicinal. As, for instance, he tells us

that because we find not either among the ancients or moderns any alkalick medicine drawn only from a simple vegetable, without any other preparation but mere trituration, therefore he will in this observation (which is the second in number) communicate an antacid medicine of much efficacy in curing the biting of a mad dog, of a viper or other serpent, of fevers, colics, wounds, &c., called by the Palermitans *sanatados*, which is only a part of a plant of no great account among herbarists; in brief, it is nothing else but the sponge of the dog-rose, called by some *bedeguar*, dried and grossly pulverized. For this biting of a viper, after scarification and cupping, sprinkle upon the wound the powder of *sanatados*, and afterwards give to drink in generous wine a good quantity of the same powder several times. For the biting of a mad dog, give of the same powder inwardly, and apply it outwardly to the wound, first moistened in strong wine, or oil olive; in like manner use it for the stinging of a scorpion. For continual fevers it is to be often taken in broth or other meats. Several other diseases he mentions in which it is useful, especially the colic, the pains whereof, being given to drink in red wine, to the quantity of about a drachm, it mitigates in half an hour's time. One thing I cannot but wonder at, that Signor Boccone should take no notice that the root of this rose had been of old celebrated by Pliny for the cure of the hydrophobia, as a medicine revealed in a dream (Hist. Nat. l. xxv, c. 2, and l. viii, c. 4), in these words: "Insanabilis ad hosce annos fuit rabidi canis morsus, pavorem aquæ potusque omnis afferens odium. Nuper cujusdam militantis in prætorio mater vidit in quiete, ut radicem sylvestris rosæ blanditu sibi aspectu pridie in fruteeto, mitteret filio bibendam. In Lusitania res gerebatur proxima Hispaniæ parte; casuque accidit, ut milite à morsu canis incipiente aquas separescere superveniret epistola orantis ut pareret religioni, servatusque est ex insperato, et postea quisquis auxilium simile tentavit."

2. Another observation he gives us concerning the

seed of *Sophia chirurgorum*, or Flixweed [*Sisymbrium Sophia*, Linn.], which being taken in wine or broth entire, without reducing to powder, stops vomiting of blood, and cures the dysentery or bloody flux, from whence the plant hath its name in English, which doth not succeed if it be well pounded or beaten to powder; the reason whereof he assigns to be, because the oily substance, which is more apt to dissolve than to coagulate, is loosened by pounding, and separated from the other parts.

A third observation we shall mention is, that in many plants the flower receives its tincture or colour from the root. He instances in the greater Celondine [*Chelidonium majus*, Linn.], whose roots and flowers are of a yellow or saffron colour. The Barbery [*Berberis vulgaris*, Linn.], or Oxantha, which also hath both roots and flower of a yellow. The Dentellaria of Rondeletius [*Plumbago europæa*, Linn.], whose roots and flowers agree in the same vinous or grisdelin colour. The *Acacia indica Aldini*, &c. The reason whereof he assigns, because the more fixed parts, wherein the colour consists, preserve the same tincture without being altered by a long circulation they make to the flower. Hence he observes that those plants are more fit for dying cloth which are lignose, and have their root agreeable in colour with the flower.

4. He gives us out of *Cæsalpinus* the preparation of *cate* (which he takes to be the same with *catechu*), which is the inspissate juice of the *Lycium indicum* [*Barleria hystrix*, Linn. ?], or tree called *cadira* by the Indians, which they thus prepare: they divide the heart (medulla) of the tree into thin slices, which they grind upon a marble such as painters use, and boil the powder in a sufficient quantity of water for twenty-four hours, and then strain it. This decoction they boil again beyond the consistency of honey, but not so hard as wax, of which they make pastilli, which, being dried, are outwardly black, but inwardly reddish. This opinion he rather adheres to than that of a late learned traveller in

India, who asserts catechu to be made up of the juice of the fruit of *Areca* or *Faugel,* and a certain mineral earth of that place.

5. He presents us with a sort of pistachio tree, which he calls *Pistacium mas siculum folio nigricante* [*Pistacia trifolia,* Linn.], which produces no esculent fruit, being by itself barren, though in respect of the female, which it impregnates with fruit, it may be said to be fruitful. Then he gives us the notes of distinction between the male and female pistachio, and tells us how the countrymen ingravidate the female with the flowers of the male, viz.: they wait till the female hath its flowers explicated. Then they take at their discretion many flowers of the male which are in bud and just ready to open, and put them into a vessel, and having encompassed them with earth moistened with water, they hang this vessel with the flowers on a branch of the female pistachio, and there leave it till the flowers be dried, so that the powder which they scatter may more easily, by the help of the wind, be dispersed over all the branches of the tree, and ingravidate them with fruit. Other more compendious ways he mentions, which the countrymen use of scattering the dust or powder of the flowers of the male upon the female. He tells us that the male for the most part flowers and scatters its prolific powder before the female puts forth its blossoms, which happens in most plants supposed to differ in sexes, and what provision they make in that case. This being the general practice in Sicily must needs depend upon observation, that without so doing the trees would not be fruitful, or at least not to that degree, and confirms the opinion that there is in plants also a difference of sex.

This whole observation about the pistachios he inserts also into his Museo di Fisica and di Esperienze Variato, &c.

6. He brings an observation concerning a woman of Chambery, in Savoy, who, being afflicted with a fierce apoplexy, after various medicines in vain used, grew lame

on her whole left side from head to foot, whom an empiric undertaking to cure spent eight boccale of aqua vitæ and twelve pounds of camphire upon her in six weeks, anointing every morning and evening the whole part affected without any benefit at all. The woman, meantime, was with child, and, without suffering any inconvenience, at her due time brought forth a son, otherwise perfect, save that all his bones were so soft and tender that he could not bear himself up on his feet, the bones of his legs, as also his arms and hands, being so tender that they seemed flexible tendons; and in this case he lived eighteen months. This effect he, and not without reason, attributes to the camphire.

I have often wondered how outlandish authors should so grossly mistake in the orthography of English words we find in their writings, but by an observation in this book concerning the *Serpentaria virginiana* (the name and a tolerable description thereof Signor Boccone had from one Edward Painthen), I perceive how it might come to pass, viz. they received these words from some illiterate Englishmen, and put them down according to the pronunciation, spelling them as words of such sound and pronunciation in their own language are spelled. So, doubtless, Edward Painthen pronouncing the word snake-root as the Italians do, *snecrut* (we often pronouncing *a* as they do *e*, and they having no double *o*), Signor Boccone writes it *snecrut*. But because he desires further satisfaction concerning this *Serpentaria virgin.*, or snake-root, I shall give him and others that concur with him in that desire a full and exact description of the whole plant, drawn up and sent me by a person that knew it very well, and was as well able to describe it, the learned and most skillful herbarist, Mr. John Banister, whose unhappy and untimely death cannot sufficiently be deplored.

The *Pistolochia*, or *Serpentaria virginiana** hath a

* Linnæus refers the *Serpentaria virginiana* of Boccone to his own *Satureja virginiana*, and that of Ray to his *Aristolochia Serpentaria*.

bushy root, consisting of a number of small strings of a yellowish colour, and hot aromatic scent and taste, thence grows one or two smooth, at least very little hairy stalks, round, and most commonly upright, not square nor trailing. The leaves grow alternately on this side and that, one at a joint or knee. They are thin, long, and pointed, coming in like a heart at the footstalk, a little hairy above, and rough with many protuberant veins underneath, and in handling they stick a little to the fingers. Near the ground grow one or two hollow flowers, each upon its proper footstalk, different in form from the *Pytolochia retica*, or any other yet known; all whose flowers (if authors' figures or the plants themselves dried rightly inform me) resemble a cow's horn, the top growing to the rudiment of the seed-vessel, and the open end cut slanting like a drenching-horn, whereas this of ours terminates with a heel, which supports a broad round galericulated lip, the centre of which opens into the hollow of the flower. The lip of a light russet or dirt colour. The seed-vessel is hexagonal, shaped like a pear, when full-grown nearly half an inch in diameter. It is not an evergreen, but after the seeds are ripe the leaves and stalks begin to wither [and] decay. It flowers in May, and its seeds are ripe in August.

Mr. Ray to Dr. Hans Sloane.

Dec. 28, —98.

Sir,—I approve much your judgment of Colbatch, but yet I think acids may cure the gout. There is a gentleman now living who was perfectly cured of the gout after it was come to be tophous, only by drinking Tunbridge waters. I thought to have put an account of Boccone's second book in this paper, but I have expatiated too far upon this. I thank the R. S. for so favorably accepting

any of my poor endeavours. I shall shortly send you Father Camelli's papers. I am in constant pain, no means I have hitherto used affording any ease or relief. My wife salutes you with tender of her humble service. I rest,

Sir,

Your obliged friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. LHWYD to Mr. RAY.

DEAR SIR,—I know not whether I ever mentioned to you (though you have probably frequently observed it yourself) in what manner the bats are lodged in the caves during winter. The caves of this country (to mention that by the by) are always (I speak of the inland caves), in limestone, and in such places only are all our subterraneous brooks, which in Wales are no great rarity. In these caves the bats choose the driest apartments, where, planting their talons to the roof, they cover their bodies with their wings, and so, hanging perpendicularly in great numbers (but so as they touch not each other), they sleep for some months.

Dôl Gelhey, Jan. 21, —9$^{8}_{9}$.

Dr. HANS SLOANE to Mr. RAY.

SIR,—This day a large tiger was baited by three bear-dogs, one after another. The first dog he killed; the second was a match for him, and sometimes he had the better, sometimes the dog; but the battle was at last drawn, and neither cared for engaging any farther. The third dog had likewise sometimes the better and sometimes the worse of it, and it came also to a drawn battle. But the wisest dog of all was a fourth, that neither by fair means nor foul could be brought to go within reach of the tiger, who was chained in the middle of a large cockpit. The owner got about £300 for this show, the best seats being a guinea, and the worst 5*s*. The tiger used his paws very much to cuff his adversaries with, and sometimes would exert his claws, but not often, using his jaws most, and aiming at under or upper sides of the neck, where wounds are dangerous. He had a fowl given him alive, which, by means of his feet and mouth, he very artfully first plucked and then eat; the feathers, such as got into his mouth, being troublesome. The remainders of his drink in which he has lapped, is said by his keeper to kill dogs and other animals that drink after him, being by his foam made poisonous and ropy. I hope you will pardon this tedious narration, because I am apt to think it is very rare that such a battle happens, or such a fine tiger is seen here.

I am, &c.

London, March 9, $169\frac{8}{9}$.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, March 14, —$9\frac{8}{9}$.

SIR,—Yours of the 9th instant I received Friday last, and next post came to hand a letter from Mr. Smith,

who, I perceive, is unwilling to let go his hold of my Supplement, and tells me at last that he supposes it will be convenient that I have the copy down again to review, and augment what I can, and that he doubted not but that they should do all things to my content; that he could not write more fully, because his partner was out of town. I had written to him to send me his final answer whether he would undertake the printing of my book this summer, and begin it May next, or no. If he answered negatively, I would endeavour to procure it to be printed by some other means; and that if he did not return answer to that letter in convenient time, I should interpret his silence as a denial, and act accordingly. But concerning my intercourse with him I have written more fully to Dr. Robinson. I now desire you would please to send down to me your Maryland plants, and the copy of my Supplement, if it may stand with your convenience, this week.

By my being so affected and hurt by the coldness of the air, I guess the gentleman you mention was of the same temper with myself. Cold was always my great enemy, and very afflictive to me. When I was young I was every winter much troubled with itching tumours on my feet, which in this country we call *bloudy fals*, but never exulcerated chilblains; whether these ulcers I now have are of the nature of chilblains or pernios I am not fully resolved, because they spread and diffuse themselves by little red flat tumours more after the manner of an herpes. I have been of opinion, and am not yet quite off it, that those little red flat tumours were nothing else but the nests of insects making *cuniculi* under the scarf-skin, and so spreading and diffusing themselves in the skin; these tumours answering to ant-hills in pasture, the insects being gregarious.

I shall be very willing and forward to serve the R. S. in assisting the carrying on of whatever methods they shall pitch upon as most convenient for the vigorous prosecution of the ends of their institution, but I do not

see how I can be any way instrumental or subservient thereto.

I thank you for your account of the tiger's combat with the dogs. That creature was very rarely seen at Rome itself. I wonder how they got it here. Surely it is no true Asiatic tiger, but an American. I take leave and rest, Sir,

Your much obliged and affectionate friend and servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane, at his house at the corner of Southampton street, towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., March 22, —9^{8}_{9}.

SIR,—The parcel you sent last week I received on Saturday, which, when I had opened, I was very much taken with the beauty of the dried plants, indeed I cannot say that ever I saw the like spectacle; such large and fair samples of rare and nondescript plants, so curiously and exactly extended and preserved, and so many of them; and could not but wish that they might be drawn, engraven, and published. But, alas! I find, as I told you, that I can make but poor work with them; the fruit or seed scarce to be seen, at least perfectly discerned, in any of them; neither the colour or figure of the flower, without marring the specimens, which it were a great pity to do; the stature to be known but in few, and nothing of the root. Those that gathered them might easily have given an account of all these, as also of the place where they were found. For my part, I am loth my work should want such an ornament, yet am I afraid to meddle with them, having not been conversant among dried plants, especially Indian and American. I am at a loss what to do in this case, and want your advice: I was in hopes that both the collectors and

yourself had named them, added some notes and remarks upon them; but, alas! I find none, so that I am in a wilderness, and at a great uncertainty. But enough of complaints. So soon as I shall have finished what additions I have to make to my Supplement out of Herman and Boccone, I shall more pressely and particularly consider and compare these Maryland plants, and see whether I can impose convenient names on any of them without committing too many mistakes, as I must certainly do by conjectures, if I should indulge myself to make many. I am, Sir,

Yours in all offices of love and service,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., April 15, —99.

SIR,—I must beg your pardon for my slothfulness in thus long deferring to answer yours of March 16th. I have been since busy in inserting the collections I have lately made out of Herman and Boccone into my Supplement; and in viewing and reviewing the parcels of dried plants you were pleased to send. Yet I would gladly see and have some conference with Dr. Kreig and Mr. Vernon, before I take any notes of them. I thank you for the account of the whale, but have not as yet had leisure to compare it with Sibbald's. I doubt not but it is one of those by him described. For my own part, though I have taken a great deal of pains, yet have I made but little progress in the History of Insects. The most that I have done is in observing the generation and transmutations of the papilionaceous tribe, of which I have found at least 200 species near my own habitation, *neidum finitæ*, every year bringing new ones to my knowledge. Of these, as many as I could get the eggs

or caterpillars of, I have fed and endeavoured to bring to their changes, though I have failed in many. This hath taken me up no small time and pains; and yet if I had not taken this course I had never seen abundance which now I have knowledge of. The other tribes of insects I have not been so diligent and curious in observing, yet have I made collections of such as came in my way.

The next tribe I intended to have fixed upon after I had despatched Papilios was Beetles, which are no less numerous, and whose way of generation is the same with Papilios, and which may be as easily fed and brought to change as they. But, alas! my glass is almost out, and I am so afflicted with pains, that I have no heart to proceed any further. Indeed I could do very little all last summer, and I must *alii lampada tradere.*

As for a method of insects, we need no better in my judgment than Dr. Swammerdam's, in his 'History of Insects,' which is the best book that ever was written on that subject. My wife and relatives salute you with the tender of their humble services, so I take leave, and rest,

Sir,

Your most affectionate and obliged friend and servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, June 2, —99.

SIR,—Since I wrote last to you, I have, with what care and consideration I could, viewed and compared your Maryland dried plants, and find that I can make but poor work with them. They all, save one or two, want roots, and I can determine the stature of but few of them certainly. The figure and number of petala in the flower can clearly be discerned scarce in any, nor the colour. The seed-vessel and seed are wanting or imper-

fect in most; so that it is a very hard matter for me, who am a stranger to them, to determine the genus. I was in hope to have seen Dr. Krieg here, who could have informed me of all these particulars; but now I hear that he is speedily leaving England. I wish you would please to inform me which of them are common to Jamaica, and described by you in your elaborate and exact Natural History of that island, if you remember or have taken notes of such, if not it must be deferred till the plants are remitted, for I would be loth to multiply and make two or three species of one.

Your Herman's 'Parad. Bat.' and Boccone's two books I intend to remit by next week's carrier, with thanks for the use of them. I must beg your pardon for having in some measure defaced them . . . . by sullying them myself, being forced to use them by the fireside, and partly by a child's unluckily scattering ink upon them. I intend to have the books myself, and if you please to send me back these again, I will order Mr. Smith to get them bound for you in the same manner that these are.

I have now agreed with Mr. Smith and partner about printing my Supplement; they are to give me for the copy in proportion as Mr. Fairthorne and Motte gave for the History itself, viz. thirty pounds in money and twenty copies bound; and I have permitted to procure what subscriptions they can to save themselves harmless. This I thought best to do, because there is such a discouragement put upon the book trade, and because I am told that should I have undertaken to publish it myself, sufficient subscriptions would with great difficulty have been procured, and I must have put myself and friends to a great deal of trouble, which by this means is avoided.

I am, Sir,

Yours entirely (cum tota sequela),

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Sir,—I have detained your Maryland plants too long, it is now time to think of returning them, which I intend shortly to do. I have now reduced most of them; some I cannot, and so must let them pass; lest I refer them to wrong genera, and impose false names upon them. To some I have put labels inscribed with their titles, in which if I have erred, when you shall have received them, I desire you would rectify me. My undertakers are extreme dilatory, and have not as yet published their proposals for subscriptions. I do not well understand their meaning in it.

I have lately received another letter from Tentzelius, in which I find him very desirous to know the judgment of the Royal Society about his opinion concerning the bones dug up at Tonna. His words are these: "Te intercedente à Doctissimo Societatis vestræ secretario literas exspecto. Ex fronte epistolæ meæ ad Magliabechium facilè cognoscet characterem meum, et ex ejusdem calce, urbem in qua vivo. Summo enim desiderio teneor videndi judicium inclyta Societatis vestræ, cujus defectus hactenus impedivit, quo minus uno libello includerentur quæcunque ex Germania, Gallia, Italia, Belgio, aliisque regionibus de elephanto nostro ad me sunt perlata." I wish this Society would satisfy him one way or other.

I am at present somewhat ill and indisposed, and shall only add the tender of my wife's very humble service, and that I am,

Sir,

Your much obliged friend and humble servant,

John Ray.

Black Notley, Aug. 16, —99.

Mr. Ray to Dr. Hans Sloane.

Black Notley, Sept. 13, —99.

Sir,—I have this morning sent back your Maryland plants, excepting one that was taken out and put in a book to be observed and described, and shall be returned again the next parcel I send. I hope these plants have received no considerable harm or damage. Some could not be avoided, in so shuffling and removing them. For I have taken the freedom to put those of a kind together, without respect to whose collection they belonged. I have also put the names and titles to a good part of them, with references to Plukenet, &c. To some I have put none, partly such as are well known, I mean their genuses, partly such whose genera are to me unknown, concerning which I desire light and information from you. I return you many thanks for the use of them, and accept of the kind offer of the sight of your collection from the Magellan Straits, which I desire you would please to send me so soon as may stand with your convenience.

I have no way of conveying a letter to Tentzelius but through the hands of Dr. Hotton, Professor of Physic and Botanics in Leyden. I suppose a letter delivered into the post-house, with a proper direction, would pass quicker and surer to him.

I have not lately heard from Mr. Smith and Walford: I perceive they will not begin to act till next term, if then; and then, if they cannot procure subscriptions enough to save themselves harmless, they will (I believe) lay the work quite aside. Possibly, if my friends would use their interest to procure subscriptions, I might be enabled to print it at my own charge, but that is not certain; and besides, it would be a business of great trouble, and I know not who to employ in it. I am still pained with the sores on my legs. I am now come to the use of strait stockings and bandage, from which I have great expectation of ease and relief, having seen the experience thereof

in the like case in a neighbour or two of mine. I have as yet made trial but in one leg, which is already much better by it. I should be ungrateful should I not acknowledge my great obligation to you for your constant and unwearied kindness expressed in many real effects of beneficence to me. My wife gives you her most humble service. I humbly recommend you to the Divine protection and blessing, resting,

Sir,

Yours in all offices of love and service,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Nov. 22, —99.

SIR,—It is now a long time since I received a letter from you. I was in hopes you would have sent me advice of the receipt of your Maryland plants, for the shuffling and transposing whereof I am to beg your excuse. I hoped also you would have given me the sight and use of the plants received from the Straits of Magellan, and some account of your answer to Tentzelius. I hope you have not taken offence at any action or miscarriage of mine towards you. I am sure I should be very loth to give any to such a friend.

I understand that Mr. Smith hath played the fool, and spoke to you again for the books I have already perused and collected out of. I wrote to him to send me those books (thinking he had them in his shop) for my own private use, to lay by me, to have recourse to upon occasion. He fancied that I sent for them in order to the filling up my Supplement. Hist.; and so, without my order, spoke to you for them.

I am in sad pain, and have little heart to write or to do anything else: the days are so short, that the forenoon is almost wholly spent in dressing my sores, which are now more troublesome than ever, notwithstanding I have used fomentations, traumatic drinks, mercurial purges, &c. I pray what think you of vomiting with Turbith mineral, which is recommended to me as a medicine which will certainly give ease. I am,

Sir,

Your much obliged affectionate friend
and humble servant,
JOHN RAY.

My wife salutes you with the tender of her very humble service.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Dr. HANS SLOANE to Mr. RAY.

London, Nov. 25, 1699.

SIR,—I saw this day the strong Kentish man; he lifted up about 2000 lb. weight, broke a rope that would lift up about 3000 lb., and kept himself from being pulled out of his place by a very strong dray-horse. He has nothing appears outwardly to give him such force.

Mr. J. MORTON, of Oxendon, in Northamptonshire, to Mr. RAY.

What are your thoughts of the origin of that concrete juice [Manna] collected from the leaves of the Calabrian Ash? Is it not an exudation, occasioned by insects opening orifices in the leaves with their terebellæ? The exudations of the leaves of oaks, ashes, and other plants in England, I think I can show are frequently occasioned by these means. Of which, see Mr. Morton's 'Nat. Hist. of Northamptonshire.'

Jan. 15, 1700.

Mr. Ray to Dr. Hans Sloane.

Black Notley, Feb. 19, 1700.

Sir,—I received yours with the inclosed from Dr. Preston, for which I thank you. When you write next to him be pleased to tell him, that I return him many thanks for the pains he hath taken in my behalf, and that I intend shortly to answer the particulars of his letter. As to my 'Methodus Emendata,' it lies by me finished, and ready for the press, but I believe will hardly ever be printed. No bookseller will undertake it, and Dr. Robinson writes me, that the undertakers for Mr. Lhwyd's 'Lithophylacium,' complain that they are losers by it, so that nothing is to be attempted that way. Mr. Smith and Walford at present are very busy in endeavouring to procure subscriptions for my Supplement, which, if they shall fail them, I believe they will not undertake it, and so that also is in danger to be suppressed.

Being much indisposed at present by a diarrhœa pretty violent upon me, I can add no more, but the tender of my wife and daughters' very humble service to you, and thanks for the obligations you have laid upon them, and that I am,

Sir,

Your very much obliged friend and humble servant,

John Ray.

I had almost forgot the particular business that induced me to write at this uneasy time, viz. that I have sent you this morning by carrier Dr. Preston's dried plants.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, April 13, 1700.

Sir,—Upon reading your letter of the 6th instant, I could not but be moved with indignation against those vile rogues, who, when they failed in their attempt of breaking open your house, were so malicious as to set it on fire. I congratulate with you your deliverance from so great a danger, and humbly thank God on your behalf.

The scurrilous pamphlet entitled the 'Transactioneer' I did always believe to be no better than you represent it.

And for Dr. Plukenet, I look upon him as an ill-natured man, and liable to mistakes, however confident and self-conceited he may be, that I say nothing of his unskillfulness and want of exactness in the Latin and Greek tongues. His arrogance and overweening opinion of himself and his performances appears by that hemistichium prefixed to his 'Phytography,'—*Nil nisi præmia desunt.*

I do not urge the sending me your Magellan Straits plants; I am in no haste for them, but can well wait your leisure.

I did not expect so great and rich an addition to my Supplement of History, as you tell me Dr. Sherard intends generously to contribute, in which respect it is well my undertakers were so dilatory in beginning upon it. It will be greatly for the advantage of the work, if ever it come to be published. I should be very glad to see Dr. Sherard, and to have some conference with him, though loth I am he should put himself to the trouble and expense of such a journey for my sake. Please to give my service to him, and tell him so much.

Your intended present of sugar doth so far exceed my merit or expectation, that I may justly be ashamed to accept it. We are so far obliged already for largesses of this and other kinds, that we want ability to make you any amends. All we can do is to retain a grateful memory of your kindness, and to own the obligation. My wife and daughters return their very humble services and thanks to you.

Dr. Tournefort's 'Institutions' may be of use to me as to the 'Methodus Plantarum Emendata,' which I have ready for the press, both for the correcting of some mistakes which possibly I may have committed, and the enlarging of it by new observations. I have done when I have told you that I am,

Sir,

Your very much obliged friend and humble servant,

JOHN RAY.

Dr. WOOD to Mr. RAY.

Kilkenny, July 18, 1700.

HONOURED SIR,—*Prunella* is a plant esteemed by all authors and practitioners that I have met with, to be a vulnerary, and used only in that case, and the distemper whence it takes its name, wherein it is effectual on the same account: but the natives of this country, who pretend to great skill in herbs, give it frequently (boiled in posset-drink) in all sorts of common continual fevers, I mean all but malignant ones, and expect great matters from it. And some give it also in intermitting fevers: but I have not been able to judge whether it be so effectual as they pretend, or no, because commonly other medicines are also given. I am credibly informed that it is used in the same case in several parts of Wales, where they call it by the same name with the Irish, *Cannavan Beg*. I would gladly be informed whether you have

known it made use of to this purpose, and with what success.

An ingenious friend of mine frequently troubled with the gout, has sometimes found ease by applying *Bardana* [*Arctium Lappa*, Linn.] to the part affected. Being lately afflicted with this distemper in his foot, he was desirous to make use of the same remedy; but by a mistake he applied a leaf of *Petasites* [*Tussilago Petasites*, Linn.] instead of *Bardana*, and being somewhat short-sighted, did not presently perceive the mistake, until morning, he was surprised with a speedier cure than he expected. For whereas the *Bardana* was wont to give him ease in three or four days' time, the *Petasites* had in one night wonderfully relieved him, insomuch that the pain and inflammation were wholly gone, and the tumour in a great measure abated. Since that time he has been very free from this distemper, but does almost long for another fit, that he might have the opportunity of repeating this experiment. I have not since he gave me this account had an opportunity of making use of this plant in this case, but question not I soon shall, the gout being of late years become very common in this country; and if I find it any way successful, you may expect to hear from me.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Aug. 14, 1700.

SIR,—You are pleased still to lay fresh obligations upon me, and load me with kindnesses. I may justly be ashamed to receive so many favours from you, and to return nothing but empty thanks, and yet that is all I am capable of doing, and therefore all you are to expect from me; who yet retain a will of making amends, if either you needed or desired it, or my condition and circumstances

should mend, which yet I have little reason to hope in that short time I have to live in this world. I must acknowledge myself also obliged very much to Dr. Sherard for so frankly communicating his vast collections of rare and nondescript plants for the enriching of my work; though the ordering and naming of them, with brief notes of distinction added, is a business above my strength, who have seen none of them growing, nor am sufficiently versed in dried plants to be able to judge of them aright.

Some of the books Dr. Sherard mentioned to you, especially Mr. Bobart's History, I would willingly see as soon as may be, that I may finish my Method of Plants, which I would fain get off hand as soon as I can, that so I may apply myself wholly to the perfecting of this Supplement. One such task is enough to take up my thoughts: *Pectora nostra duas non admittentia curas.*

The letter you sent me came from Father Camel. I doubt not but Dr. Sherard hath shown it to you. I should be very glad to hear that the designs and descriptions he mentions were received: they would be a very great advantage and ornament to my work. I cannot but look upon it as an effect of Providence to stir up a man so well skilled in plants to apply himself to the inquisition, delineation, and description of the plants growing in those remote parts of the world, and giving an account of their virtues and uses.

My wife gives you her very humble service, so I take leave, and rest,

Sir,

Your very affectionate and much obliged
friend and servant,
JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, Aug. 21, 1700.

Sir,—These are to acquaint you, that I received last week from Mr. Smith the third part of Morison's History, which I thought necessary to give you advice of to prevent the sending that book among the rest which you are pleased to favour me with the loan of, and which I shall run over and remit so soon as I can. I doubt whether my letter to Dr. Sherard found its way to him, because it had only a loose and general description, viz. to him in Mark lane. I have been this day or two very ill of my usual distemper. My wife salutes you with the tender of her very humble service, and that I am,

Sir,

Yours entirely,

John Ray.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, September 18, 1700.

Sir,—I received your rich present of sugar, which needed no excuse either for quantity or quality, far exceeding, I do not say the merit, for that is none, but the expectation of the receiver, and suitable, I should have thought, to the largeness of your own generosity. All the amends you are to expect from me is thanks, which I return, together with wife and daughters, whom you have highly gratified and obliged; not but that I retain a will, if occasion offer itself and ability serve, to requite your kindness, and serve you to the utmost in anything

wherein you might stand in need of assistance, but because, in the circumstances I am, I do not foresee any likelihood of that.

This morning I sent you by carrier M. Tournefort's 'Institutions,' which I had done sooner had I known you needed them. I am now busy in running over Mr. Bobart's History, wherein I find more new plants than I expected, a great part whereof are owing to Dr. Sherard's collections, so that it is likely to take me up a great deal of time.

I thank God I am able to go on with this work, though I have little or no absolute intermission of pain; and so it is more troublesome and difficult to me by far than it would be were I well. I thank you for your advice, and do find myself at present somewhat better as to those particulars I mentioned.

I have a small present for you, a little tractate of about half a dozen sheets of paper, which I drew up at the request of a friend last winter, entitled, a 'Persuasive to a Holy Life,' &c. It hath been finished a pretty while, and I wonder Mr. Smith is so slow in putting it to sale, and that I hear nothing from him about it.

I am, Sir,
Your very affectionate and much obliged
friend and servant,
JOHN RAY.

I suppose Dr. Sherard showed you Father Camel's letter to me; I am very solicitous about the descriptions, designs, and draughts he mentions to have sent, and should be glad to hear of them.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

FATHER CAMEL to Mr. RAY.

ERUDITE DOCTISSIME AC COLENDISSIME DOMINE, DOMINE JOANNE RAYE.—Literas tuas Notleiæ in Essexiâ 19 Januarii anni 1700 ad me datus accepi 18 Septembris ejusdem anni, in quibus rescribis accepisse plantas illas *Luzonis* quas mittebam. Reliquarum Iconas misi Januario anni 98: sed navis à piratis intercepta fuit, et probabiliter perière. Misi postea denuo Icones plantarum humilium unà cum descriptionibus Januario anni 99. Verùm ob mortem D, Samuelis Brauwne, quò devenerint me latet, scripsi D. Edwardo Bulkleyo Meliaporum ut ea requireret; ac simul literas tunc pro te expeditas. Miraris me scripsisse Indigenas Philippinarum domestica fastidire, et negligere, peregrinis verò inhiare; sed hoc non sit ob defectum medicaminum domesticorum, verùm ob cognitionis, ut scribebam, defectum. Et si Europam Thomas Bartholinus exoticis non indigere sentit, multò minùs meâ sententiâ opus habet India Europæis. *Nucem vomicam off.* Fungum appellavi cum *Cæsalpino* et *Chinensibus*, non tamen pro tali habebam, cùm simile semen, (quamvis minus) invenerim plantæ volubilis, et postea priùs maceratum dissecuerim, facilè in duas placentulas dispescuerim, et dividuum seminale corculum in eâ invenerim. *Pseudo-Amomum* quorundam, seu *Caryophyllon Plinianum Clusii* suspicabar esse unam *Fagaræ*, verùm paulò pòst certior factus fui in *Luzone*, et adjacentibus *Fagarum* adolescere utramque. Pro nunc, et cum præsentibus plura de plantis non mitto, quia rogatus à D. Doctore Wilhelmo ten Rhyne, ei omnia, quæ de plantis adnotata asservabam Bataviam misi, qui utrùm ea, vel aliqua ex iis, fortè unà cum plantis quas ipse Javæ observavit, typis mandare cogitet, ignoro; certiorem te faciam ubi responsorias nactus fuero à D. ten Rhyne. Mitto hâc occasione D. Jacobo Petiver (quia te morbis provectæ

senectutis molestari considero) paucula de insectis quibusdam, qui ut spero ea tecum communicavit, plura dabo occasione proximâ. Interim vive diu felix, et annis senectutis placidâ salute comitatis, quàm dulcissimè fruere in annos plurimos ut ex animo precatur,

GEORGIUS JOSEPHUS CAMELUS.

Dabam Manila, 28 Octobris, anni 1700.

MR. RAY to FATHER CAMEL.

REVERENDE PATER, AMICE COLENDISSIME,—Literas tuas novissimas accepi superiori æstate, et post dimidii anni expectationem descriptiones et icones *Stirpium Luzonicarum:* pro quarum magnifico sanè et gratissimo munere me tibi valde obnoxium et obæratum esse lubens agnosco, et plurimas gratias ago. Opportunè admodum advenere: nam 'Supplementum Historiæ meæ Botanicæ,' prelo aptatum est, et jamjam imprimi cœptum, cui descriptiones tuas et historias *Luzonicarum* adjiciendas curabo, omnes unà, eodem quo dispositæ sunt ordine, præfixo nomine tuo cum debito elogio, nè si eas distraherem, suisque locis secundùm methodum nostram Supplemento insererem, opus extenuarem, illud in tot particulas discerpendo, et longiùs à se invicem removendo. Reliquas Scandentium et Arborum historias, quas adeò generosè aliâ vice te missurum promittis, ut quàm potes celerrimè expedias oro, ut antè opus nostrum integrum absolutum huc appellant, suùmque in eo locum inveniant. Icones pulcherrimas, et lucem publicam (si ita loqui liceat) videre dignissimas, quæ descriptiones mirificè illustrant, à typographis et bibliopolis nostris ob sumptus in calchographis faciendis, ut impensis suis imprimant ægrè, ut vereor, impetrabo. Conabor tamen (quantum in me est) ut id effectum reddam.

D. Petiver à te efflagitat, ut ramulos stirpium descriptarum et depictarum in schedis ad nos transmissis, exsiccatos transmittere digneris, ità enim certius judicium de eis fieri posse, conferendo cum plantis quas ab Indiis exsiccatas amici plurimas transmiserunt, an scil. novæ et nondum à se visæ fuerint. Exsiccari autem posse extensas cùm noviter decerptæ sunt inter chartas bibulas seu emporeticas reponendo, et subinde antequam putrescant mutando, donec exaruerint.

Valeas, celeberrime vir, Historiæ Botanicæ promovendæ nate, immortali laude dignissime, et opus in quod tantum temporis studii et laboris impendisti, totam nimirum Philippinarum insularum historiam naturalem, felicitèr absolvas, ità precatur.

Mr. J. Morton, Rector of Oxendon, in Northamptonshire, to Mr. Ray.

Amongst the many requests which are made to you by the learned world, permit me to mention one, that is, that you would enrich the public with the history of the Scripture plants; a work which, although attempted by some, is certainly one of the desiderata still; and all do agree you the fittest person in the world for it.

November 23, 1700.

Mr. Ray to Dr. Hans Sloane.

Black Notley, December 1, 1700.

Sir,—I find that you are unwearied in loading me with kindnesses. I lately received from one of the best of my friends, Dr. Hotton, that after two letters to Mess. Smith and Walford, to inquire whether I were

alive, and how I did; he could obtain no answer, whereupon he addressed himself to you, who presently satisfied him.

I am now much worse than when I wrote to you last, being, by the sharpness of my pains, reduced to that weakness that I can scarce stand alone, so that I lay aside all thoughts of the History of Insects, and despair even of life itself.

I remember in one of your former letters to me, you told me that my condition might lead to a dropsy, and did advise to a chalybeate course. I now find your prediction true, my feet and legs swelling and puffing on the least pressure. I humbly beg your advice at this time how I ought to do.

My wife gives you her most humble service, so do my daughters. I am,

Sir,

Your extremely obliged, most humble, and obedient servant,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Dr. PRESTON to Mr. RAY.

SIR,—Since my arrival in Scotland, I have been so much diverted by business that I have got but little spare time to mind anything of curiosity (save this last summer that I made some few observations on plants), which has been the occasion of my long silence. Besides, I could not perform my promise in giving you the synonyme of such plants as were entered in the 'Elementa Bot.' under a new name, and as nondescripts, and yet were old plants, for I wanted the Elementa Bot. And having advice from

Paris of his [Tournefort's] publishing the Latin edition with all expedition, made me something remiss; for I knew he would save us that trouble; therefore I hope you will excuse my silence, and I shall recompense it by transmitting to you from time to time such observations as I had occasion to make. I do not propose any order or method in doing it, but give them you, such as they are, as they come to hand. I confess Tournefort in his Elem. Bot. hath treated both you and my countryman, Morison, very indiscreetly, for which I did reprove him while at Paris, and desired him to correct that as well as other things in the Latin edition, which he promised to do; and, accordingly, I find all along in his characters he has omitted what he said in the other edition against you. In this Latin edition he gives a very good account of the rise and progress of botany, and of the several writers thereof, from Hippocrates' time to our days, among whom Gesner, Cæsalpinus, and Fabius Columna were the first who laid down any solid and rational principles of method, and for constituting the genders of plants; and as Tournefort says very well (Instit. Rei Herbariæ): "Eaque in tenebris adhuc jaceret nisi Robertus Morisonus Scotus eam quasi ab herbariis ab alienatum renovâsset instaurâsset et primus ad usus quotidianos adjunxisset." After him you have been the great restorer of method and ornament of botany by your several learned writings. Dr. Herman, whose memory is to be lamented, was a great promoter and follower of the same method, and designed to publish a short compend of it for the use of his scholars, if an untimely death had not prevented him, as may be seen in the 'Flora Batava non edita.' Rivinus has a singular method, and establishes the character from the number of petala in a flower. Last of all, is Tournefort, who finding so many learned men had writ before him, and that he could not propose to make great advances in following the same method, therefore, to gain a name to himself, bethought on this new method, of

classing the plants by their similitude in flowers, and distinguishing them into several genuses by their seeds and seed-vessels, not knowing whether the method would take or not: but it is no more than the other method inverted; and since he has once published it, he is obliged to maintain and defend it, whatever inconsistencies there may be in it. Tournefort, indeed, is a most indefatigable and nice observer of nature, but I do not think that either his method is to be accounted the best or only infallible; for it may be made appear that his method is as liable to objections, and he as subject to mistakes, as others. We are certainly obliged to the writings of those learned men, and every one of them deserveth just praises, but I think it may be done without detracting from the merit of others. I confess I judge it a very difficult matter to lay down such principles of method as will comprehend even the species of plants already known, and far less those that are yet undiscovered, or that will not be subject to change or admit of alteration; for I find, by the few observations that I made this year, that a plant must be viewed in all the seasons of it before one can venture to give a true and exact character of it: and it is not one single observation that is sufficient to constitute the character of a plant, for that may escape our sight or memory at one time which we may discover at another. Besides, a plant appears under several disguises or shapes before its fruit come to maturity, therefore it must be from repeated observations in all the seasons of it; for I have found, that after having viewed a plant with all the niceness and exactness imaginable at one season, yet on a second review I have been obliged to alter my thoughts; for instance, in the *Herniaria*. Neither is it to be thought that botany alone is come to that height of perfection as to need no help or correction, or that it is less capable of improvement than other sciences are; for how many new species have been discovered of late years both in East and West Indies never

known in the world before, and how many lie hid to this day? Has not botany made more advances and is more improved in our days, by the several learned men and writers thereof, than for some ages past; and I think we owe no less obligation to the revivers and restorers of method than to the first inventor. Anatomy is a science which it is thought might have come to its height of perfection long ago, by the many and frequent dissections on human bodies of learned and curious men, and yet we find several things have escaped even the knife of the most curious dissectors for some ages past, and are only discovered in our days. So it is as to botany.

Now, sir, I shall subjoin a few of these observations that I have had occasion to make; and first I begin with some of those in the former queries, where answers were not so distinct or positive, or where I have since found myself to have been in an error.

Alsine scandens baccifera, C. B. P., *Cucubalum Plin. Lugd.*, Tournefort [*Cucubalus baccifer*, Linn.], has a pentapetalous flower, "flore caryophyllo petalis bifidis calice pelviformi vel instar *Lychnidis* cujus pistillus mutatur in baccam vel capsulam ovalem semina plurima reniformia placentæ adhærentia continentem." The reason it appears to be capsular, because it is not juicy. Tournefort (Inst. R. H.) places it "inter herbas flore Caryophyllio cujus pistillum abit in fructum," after *Lychnidis* species, and nearest to the *Lini* species: by reason of the flower and calyx it is well enough placed, but by the fruit, it ought rather to be placed amongst the bacciferous plants.

Pimpinella Sanguisorba minor lævis, C. B. P. [*Poterium Sanguisorba*, Linn.], has a monopetalous flower, divided into four segments, *ad centrum usque*, whose calyx becomes a quadrangular capsule, in which are ordinarily contained two oval seeds or kernels, sharp at one end. Tournefort, in his Elem. Bot., gave them *flores pelviformes*, but in his 'Inst. R. H.' places them "inter herbas flore monopetalo rosato cujus calix abit in fruc-

tum," after *Moschatellina,* and I think very improperly, for the fruit of Moschatellina is reckoned bacciferous; but I could never as yet find the fruit come to any perfection. There are several of the *Pimpinellæ* species that seldom come to maturity, therefore it is difficult to make observations on them to purpose.

Ageratum vulg. foliis serratis [*Achillæa Ptarmaca,* Linn.?] I find constantly with a radiate flower, and is so placed by Tournefort (Inst. R. Herb., 496), so that he has corrected himself in this particular.

I have been mistaken in my former account I gave you of *Herniaria,* following too much the faith of Dr. Tournefort, not having examined it nicely enough myself; therefore what I have discovered since is as follows: *Herniaria Ger.,* J. B., has a tetrapetalous and herbaceous flower, whose pistil becomes a round membranoidous carinulate or straight capsule, like the fruit of the *Linum catharticum,* divided into eight loculaments, in each of which is contained one small seed, *ovato-acuminatum.* Besides the four herbaceous petala, that are green without and white within, it has also several stamina; but those petala never become the *involucra seminis.* This is what I have found on repeated observations. Tournefort (Inst. R. H.) places it "inter herbas flore stamineo cujus pistillum abit in semen calice obvolutum;" and in the particular note says, "Quoad pistillum deinde abit in semen in capsulâ oblongâ et striatâ, quæ calix floris fuit, reconditum." But this plant cannot properly be called stamineous; for the petala or calyx never become the capsule or *involucra seminis;* but they have a distinct thin membranaceous capsule, as above described. You have also given it a stamineous flower, consisting of four herbaceous petala, and placed it amongst the *Polygonums;* but whether it can be properly called stamineous for the reasons above, I leave it for you to determine.

Quære if *Herniaria, Ger.,* J. B. (page 69, Synopseos) [*H. glabra,* Linn.], be a distinct genus from *Millegrana*

minima Ger. (Syn., p. 207), [*Radiola millegrana*, Sm.] The last is placed amongst the vasculiferous plants, with a pentapetalous flower, but more particularly amongst the *Alsines* species, *Anomalæ flore tetrapetalo.* This note seems to agree even to the *Herniaria Ger.*, J. B., in that it is vasculiferous, and has a tetrapetalous flower; the other placed amongst the *Polygonums*, and you have given it a stamineous, but tetrapetalous flower: so that they seem not much to differ in flower. The reason of my query is, because in all those I had occasion to meet with, both in *Ericetis*, on lee-grounds, and in corn-fields, I could never observe any difference in the characteristic, but only as to the growth. I shall not question but there may be two distinct genuses under that name, but I should be glad to know if it is of your own observation.

Eruca maritima Anglica siliquâ fungosâ Morisoni [*Cakile maritima*, Willd.], plantæ genus flore et calice tetrapetalo, cujus pistillus mutatur in fructum oblongum fungosum geniculatum et in duas capsulas divisum in quibus singulis unicum continetur semen oblongum. Tournefort (Inst. R. H., p. 212) makes this plant a species *Crambes*, under the name of *Crambe maritima foliis Eruc. latioribus fructu hastiformi;* but it does not agree to the character of *Crambe*, and therefore I think Dr. Herman was rather in the right, who says it has *capsulam dyspermam.*

Anthyllis maritima lentifolia, C. B. P. [*Arenaria peploides*, Linn.], is placed in your Syn. amongst the pentapetalous and vasculiferous plants, next the *Alsines* species, and I think with very good reason; for, by observing the plant, I find it to have a pentapetalous flower, and calix petalis ut plurimùm bifidis cujus pistillus mutatur in capsulam subrotundam et acuminatum in cujus cavitate semina plurima rotunda et alba continentur, so that it may very well enter that tribe. I cannot find where Tournefort has placed it, except it be under the name

of *Alsine maritima supina villosa foliis lanceolatis.* (In appendic. Inst. R. H., p. 665.)

Equisetum fœtidum sub aquis repens [*Chara vulgaris*, Linn.] As for the flowers of this plant, I could never observe it with any, sed semina profert rotunda, ad singulos nodos foliolis adhærentia, foliis rigidis et asperioribus et brevioribus, odor gravis.

Equisetum non fœtens sub aquis repens. Caules emittit graciles glabros, intus cavos et succo viridi repletos, ad singulos nodos etiam semina profert minuta rotunda foliolis adhærentia, eodem modo ut in alterâ specie quæ fœtida est.

Equiseti fœtidi sub aquis repens, secunda species. This plant has longer, more slender, and smaller leaves than the former, ad Spithamæ unius longitudinem crescentia, more greenish, et non tam rigida ut in alterâ specie, sed semina profert minuta rotunda rubescentia ad singulos nodos foliolis adhærentia ut in priori specie, odor gravissimum. I know not if these two last species be described.

Kali spinosum cochleatum [*Salsola Kali*, Linn.], plantæ genus flore stamineo vel apetalo, cujus calix è 5 foliis acuminatis componitur, quæ simul juncta capsulam constituunt quasi echinatam, in quâ unicum continetur semen subrotundum spiræ in modum convolutum vel cochleæ ad instar. Tournefort (Inst. R. H., p. 247) places this plant inter herbas flore rosaceo cujus pistillum aut calix abit in fructum unicapsularem. After the *Junci* species, and next the *Telephii* species, in the particular note he says, "Quod pistillum deinde abit in fructum fere globosum membranaceum singulari semine fœtum, cochleæ ad instar intorto et plerumque petalis florum obvolutum." On very strict observation in all the seasons of it, I could never discover any petala but only stamina; so that I see no reason for your giving it a rosaceous flower, except one would take those echinac leaves of the calyx for the petala of the flower, which I think scarce any botanist

would do; and if it were so, it would be still a stamineous flower, even according to his own sense of stamineous, if the petala become the involucra seminis, as he says they do for the most part in this. In his 'Elem. Bot.' he has given it also a rosaceous flower, but wanting a calyx, whose pistil becomes a round and membranaceous fruit, in which one seed is contained spiræ in modum convolutum; but neither of these characters agrees to this plant, for I found it constantly as above described. So that Tournefort must either be very far mistaken, or the plant must vary in different places.

Kali minus album semine splendente, C. B. P. [*Chenopodium maritimum*, Linn.; *Schoberia maritima*, C. A. Mey.], has a stamineous flower, whose calyx consists of five leaves, and together compose a round capsule, in which one round and shining seed is contained. You have placed it amongst the *Blita*, but it does not agree to Tournefort's character of the *Blita*. He has excluded it from the *Kali* species, but where he has reduced it I cannot find.

Lichen vulg. [*Marchantia polymorpha*, Linn.] I could never observe it to have any flower, but there arises from the middle of the leaves a long, slender, and white pedicule, aliquando ad digiti unius longitudinem assurgens. It is hollow and pellucid; on the top of which there is a round black head, or capsule, fitted with a farinaceous and greenish substance, quod reverà locum seminis supplet., or the seed itself, as observed by Tournefort with the help of a microscope, and is subrotunda. This capsule being so very slender, soon opens or breaks by the heat of the sun, and then it appears of the figure as in Tournefort's character, but is constantly round (ante rupturam), so that it would appear Tournefort has not observed them in all seasons; for early in the spring it is easy to observe them as above described, but they are not able to endure heat, and so quickly vanish.

Alsine rotundifol. seu Portulaca aq. minima serpyllifol. [*Peplis portula*, Linn.] This plant was past the flower; the pistil of it becomes a round capsule opening into two

parts, horizontaliter, et pyxidis in modum, in whose cavity are contained many round and small seeds. Calyx tetrapetalous. It riseth about an inch high; the leaves resemble those of *Serpyllum vulg.*, and the capsules those of *Anagallis fl. phœniceo*, but differs in this from *Anagallis*, quod capsulæ in alis foliorum positæ sunt et pediculis carent.

Asphodelus palustris Scoticus minimus [*Tofieldia palustris*, Huds.], plantæ genus flore hexapetalo rosaceo, calice carente, cujus pistillum mutatur in capsulam oblongam acuminatam et in 3 loculamenta divisam, in quibus singulis semina plurima continentur aristata. You have placed it inter bulbosis affines, without any particular note of flower or seed-vessel. Where Tournefort has classed it I cannot find, for his book is deficient in a good index.

This letter being sufficiently charged, I shall reserve what other observations I have made till another occasion. I doubt not but your Supplement to your History will be near completed by this time; and as for your Methodus Emendata, it is what I shall expect with impatience.

Edinburgh, Jan. 13, 1701.

Mr. Ray to Mr. James Petiver.

Black Notley, February 3, 1701.

Sir,—I have, though long first, returned you the box of plants you were pleased to send me, for which I give you many thanks, and especially for the names and notes added to them, without which I should have made but bad work with them. I find among them many very rare, and indeed wonderful, species, especially of ferns. I now entreat you to send me some more tribes, for Mr. Smith calls upon me for the copy, and is, I believe, resolved in good earnest to begin to print the work this

spring. I want now not much but your contributions to perfect the herb. part—I mean so far as I am capable of doing it. I wish you good success in your labours and endeavours for carrying on and promoting natural history and the knowledge of the works of God. For my part I have done, finding my memory and parts fail me, and being almost continually afflicted with pain, so that indeed it is time for me to prepare for death, which seems to approach. I rest, Sir,

Yours to serve you,

JOHN RAY.

I pray present my humble service to Dr. Sloane and Dr. Sherard, and any other friends who may happen to inquire of me.

For Mr. James Petiver.

Mr. RAY to [Mr. JAMES PETIVER?].*

SIR,—Your very obliging letter of April 1 came to my hands last post, for which I return you most hearty thanks. I am sorry that my bookseller should be constrained to give my friends the trouble of procuring subscriptions for the printing of a book which perhaps may not deserve it. That which gives it value is what yourself, Dr. Sloane, and Dr. Sherard have already, and shall yet further contribute to the enriching and perfecting of it. Since I came to prosecute the work in good earnest, I have been in no case to travel to visit gardens, and to see plants growing, flowering, and seeding. Dried specimens, figures, descriptions, and names of plants, is all I have had to work by, so that I must needs be liable to commit a thousand mistakes. Had I had several specimens of the same plant, in its several growths, I might have been better able to judge of it. Upon this and other accounts, you and the persons forenamed would

* Found in the Sloane MS. without direction, but most probably is the letter referred to at page 393.

have made far better work than I have done, or can do. However, I must now go through with it, and shall thankfully receive what you shall further please to communicate, and insert each particular in its due place, according to the best of my skill. I am very glad you have found out and received Father Camelli's papers, who deserves the character and commendations you have given him. So soon as I shall have received and considered his descriptions and designs, I shall send him a letter of acknowledgment and thanks, with a request that he would send his designs and history of trees and climbing-plants, which, in his letter to me (which is now in Dr. Sherard's hands), he promised.

I am sorry for the news of Mr. Brown's death, which I heard not of before the receipt of your letter. He was a very commendable person, very ingenious, and as well fitted as inclined to promote natural history.

I have seen and read, and transcribed into my Supplement, what I found of your notes and remarks upon Mr. Brown's two books of plants in the 'Philosophical Transactions.' You have discovered so many oversights and mistakes in Dr. Plukenet's works, that I fear he may have led me into some errors, who followed him as a most exact botanist, without due examination. You that have seen his dried plants, and have often received specimens of the same, are better able to judge of his performance.

I am glad your business increases so as to require more attendance, and take up more of your time, which cannot be better employed than in the works of your proper callings. What time you have to spare you will do well to spend, as you are doing, in the inquisition and contemplation of the works of God and nature. Indeed, you are highly to be commended for what you have already done, and encouraged to proceed with vigour, notwithstanding the snarlings of some silly pretenders to wit, whose scoffs you need not more to value than the barkings of small whelps in the street.

The sharpness of the weather, and unusual continuance of it, doth so affect my legs, that I am scarce able to attend any studies, and hath much retarded my proceedings, fixing me constantly to the fireside. I shall add no more but prayers for a blessing upon your laudable endeavours, and thanks for your constant affection to,

Sir,

Yours in all offices of love and service,

JOHN RAY.

Black Notley, April 4, 1701.

Dentaria affinis annulos, H. R. P. Herbe cachée ou clandestine de Léon, Lugd. edit. Gall. 960.
Clandestina flore albo, Bonelli Obs. 30, *cent.* 1.

DESCRIPTIONEM hujus plantæ ex 'Histor. Lugd.' ita Suppl. Herbam hunc Clandestinam seu occultam denominavi, quod folia producat sub terra latitantia, quæ membranacea sunt, alba, fungis illis similia, qui super arbores vetustas nascuntur, suntque semper virida, nec unquam decidunt una constipata ad modum pomi pinel. Radix pedali circiter longitudine est, tenuis seu tenella, spongiosa, flavicans, medullam seu cor intus habens parvum et velut lignosum plantum hanc primo vidi florentem ad Pancorvù dioceseos Purgensis, anno 1578, loco humido ad viam publicam non procul Fontibus Montoriæ, qui exeuntâ flumine Mirandam del Ebro præter labente, postea vidi innumeras prope Leovera comitatûs Perniæ in foresta la Dehesa, dicta ubi planta hæc probè cognita est nomine Madronnæ, hoc est, matricis herbæ, cò quod mirabiliter conducit ad humiditatem et oppilationem uteri ut experientiâ longa didici, tam folia ipsum flores amara sunt, sed præcipue flores, qui nonnihil etiam acrimonia obtinent.

Dentaria quam vidi in loco à D. Raio memorato ad 4, pollicum altitudinem supra terram assurgit, è pluribus cauliculis sibi invicem proxime admotis, composita: quod plantam densam admodum et (si ita loqui liceat) cespitosam reddit, unusquisque cauliculus florum congeriem gestat vêlut in fasciculum dispositam. Flores autem isti binatim è caule exeunt secundum totam ejus longitudinem pediculis sustentati cylindricis, rectis, diversæ longitudinis, illi iterum qui à partibus caulis inferioribus exeunt, duos circiter digitos transversos longitudinis obtinent, reliqui ordine quo summitati propiores eo breviores evadunt, ea proportione ut flores omnes, tam superiores quam inferiores æquali fere altitudine terminantur, unusquisque à pediculus ad pedem seu exortum suum specie quadam folii seu squamæ instruitur figuræ . . . . . versus summitatem ore tenui et ferè transparenti terminata et pluribus radiis obscuris striata, reliqua pars folii dicti tenera est et carnosa unusquisque insuper pediculus sustinet calicem scyphi figurâ 8 circiter lineas longum et 5 linearum diametro, membrana tenui, rufescente et canaliculatâ à summo ad unum constante. Summa pars hujus scyphi in 4 folia finditur, quæ in punctum terminantur paullum obtusum, ab hujus fundo exit flos tubulosus 14 linea longus, duas circiter latus. Tubus isthie prope mediâ longitudinem in dua labia dividitur, quorum superius, quod majus est, latera sua et anteriorem partem deorsum reflectens et dorsum in fornicem elevans, speciem quandà galeæ efformat; inferius deorsum vergit versus extremitatem suam, quæ in tres partes dividitur, estque ejusdem fere figuræ cum Orobanches flore. Flos isthic 4 staminibus donatur, è quibus duo grandiora ab interiori parte labii inferioris duabus circiter lineis â tubi fundo originem sumunt, reliqua duo à lateribus labii superioris circa locum ubi tubus se findit oriuntur. Stamina isthuc filamenta valde tenuia sunt, quorum unumquodque parvum apicem gestat.

Fructus ovalis est, paullum planus, lineæ unius diametro carnosus; è fundo calicis exit, seque in posteriorem

floris pultem ingenit, inque stylum terminatur pollicem et dimidium longum et inferius prope extremum intortum. Fructus isthic cum maturescit et grandescit formam cordis assumit, et granula triangularia continet et neque fructum nec semina perfecta vidi color floris è rubro violaceus est, ut et summitatum calicis. Caules et floram pediculi albi sunt, carnosi teneri et fragiles, unusquisque caulis 18 circiter florum fasciculum sustinet.

P. Sherard ob convenientiam notarum plantam hanc eandem cum clandestina Tournefortii flore subcœruleo 'Institut. Rei Herb.,' p. 652, sibi persuadet cujus opinio et nobis verisimilis videtur. Descriptio autem D. Tournefort sic se habet clandestina est plantæ genus flore monopetalo personato, infernè tubulato, supernè in duo labia diviso quorum superius fornicatum inferius vero tripartitum. Ex calice autem tabulato pariter crenatoque sergit pistillum quod infimà floris partem perfodit, abitque deinde in fructum oblongum . . . . salarem in duas partes dehiscentem vi elactica semina subrotunda propellantes. Clandestinæ speciem unicam novi cujus varietates sunt.

Mr. Ray to Mr. James Petiver.

B. N., April 15, 1701.

Sir,—It is not long since I wrote to you at large, in answer to yours of April 1, since which time Dr. Robinson tells me that you had an opportunity of sending to Leyden, and would do me the kindness to convey the manuscript of my 'Methodus Plantarum Emendata' to Dr. Hotton, in order to the printing of it there; whereupon I have sent up the copy to you, entreating you to take the care of it, and to transmit it to him when occa-

sion serves; which doing, you shall lay a further obligation upon him who is already indebted to you,

Sir,

Your faithful friend and servant,

JOHN RAY.

Be pleased to hasten your observations upon, and additions to, the first tribes, for the booksellers make me believe they will begin to print suddenly, if they can but get subscriptions for 200 copies.

For Mr. James Petiver.

Mr. RAY to [Mr. JAMES PETIVER?].

SIR.—I received by the last week's carrier the parcel you sent me, containing Father Camelli's papers; and your own plants, and observations thereupon, to be added to the first three tribes of Fuci, Fungi, and Musci. You have gratified me very much, and by adding the names to each plant, have eased me of a great deal of trouble I should have been put to in searching them out, and at last should not have done it half so well as you, to whom they are so familiar and well known; and I entreat your assistance in like manner in contributing your notes and additions to the following tribes, which you may do at your leisure and best convenience, they having not yet begun to print the work, which stop is partly owing to myself, I desiring the first tribe back again to make some additions to it, as particularly the submarine plants you sent, which I know not through whose negligence I have not yet received.

When you see Dr. Sloane, be pleased to acquaint him that I have received his books of Magellanic and Aleppo Plants, which I return thanks for, and shall be careful of, that they receive no harm.

Several of the ferns you sent me are very rare and

strange plants, the like whereto I never saw before. If you remember the *Adiantum nigrum speciosum canariensi*, I pray consider whether it may not be the same with *Filicula lusitanica Polypodii radice*, described and figured in 'Hort. Reg. Monspel.'

I wish you happy success in your studies and endeavours in promoting natural knowledge, and illustrating the power and wisdom of the Divine Creator of all, to whose holy protection and blessing I humbly recommend you, and rest,

Sir,

Yours to serve you,

JOHN RAY.

Black Notley, May 3, 1701.

Mr. RAY to Mr. JAMES PETIVER.

Black Notley, May 20, 1701.

SIR,—I wrote to you not long since to give you advice of the receipt of your dried plants, and your annotations upon, and additions to, my first four tribes of Fuci, Fungi, Musci, and Capillares, in which, by adding names to the several species, you have eased me of a great deal of pains and trouble, and enabled me to perform better than, without such your assistance, I could have done by my utmost diligence and industry, so that I must acknowledge myself to be highly obliged by you. But this hath been the subject of my former letter, and therefore I shall add no more.

My business now is to entreat your care in dispatching the inclosed by the first opportunity to Father Camelli. It is to desire that he would speed the sending of his figures and descriptions of the scandent plants and trees, which he promised in his letter to me (which is now in Dr. Sherard's hand), that if possible they may come timely enough to be inserted in the appendix to this Supplement.

I have, by the person who will bring or send you this letter, your friend and neighbour Mr. Bourchier, sent up the three tribes of imperfect plants, to be speedily put into the printer's hands to be begun upon. I am,

Sir,

Your faithful friend to serve you,

JOHN RAY.

I had almost forgotten to return you thanks for the present of your eight century, which I received in a packet from Mr. Smith.

. . . . . med friend
. . . . . iver.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, August 27, 1701.

SIR,—I received yours of August 23, with the inclosed from Dr. Preston, in answer whereto, first, I return you most hearty thanks for your great and unmerited kindness many ways expressed, as for being concerned for both mine and wife's illness. For mine own part I have been in worse condition this summer, by reason of the multitude of my sores, and their extreme painfulness, than ever, though, I thank God, I have not been inwardly sick or any way indisposed. About some three months ago, a gentleman of mine acquaintance wrote me word that a gentleman's son thereabouts, who had a running sore in his back so long, that it had almost brought him to his grave, and had had the advice of the ablest physicians and chirurgeons about town without any success, was brought back into the country, and at last, by the prescription of a diet-drink given by a poor woman, was perfectly cured. The diet-drink was this:

Of oak-bark, taken green from the tree, ¼ of a pound;

of ribwort, monsecar, comfrey (leaves or root), cinquefoil ana, 1 handful. Put all into three or four gallons of ale; boil it as you do hops, and drink it for your ordinary drink.

Advising with some friends whether it might be safe for me to use this diet-drink, and being encouraged by them, I got it made, and drunk of it for about a week, by which time the vessel leaking, had run out all my drink. This drink had not the effect of drying up my sores, but effectually stopt my diarrhœa, so that, ever since, my belly hath been astrictior. I am not sorry that I lost my liquor; for though, if I could have gone on with it, I believe it would in time have stopped my sores, but I fear would have had an ill influence on my health.

Since the time of drinking this diet-drink, Sir Thomas Millington coming to see me, discovering my condition, told me that he believed no outward application would do me any good, and advised me to use a plain antiscorbutic diet-drink, made of dock roots, water-cress, brooklime, plantain, and alder-leaves, which I have done now this fortnight, but as yet have received no sensible benefit by it, my sores running as bad, and being as painful as ever.

My wife hath been very sick of the epidemical fever hereabouts, but, thank God, is now perfectly recovered. She gives you her most humble service. Another expression of kindness is your intention to make us another present of sugar. We have been already so extremely obliged to you for many presents of this nature, that I am greatly ashamed to receive any more, having no prospect of ever making you the least part of an amends. I want words to express my thankfulness, and therefore can add no more on that subject. The books I have of yours, besides the two great volumes of dried plants, are 'Hyacinthi Ambrosini Phytologia,' Cupani's 'Hortus Catholicus,' with the second Supplement in sheets, Boccone's 'Observazioni Naturali,' and Rauwolff's 'Itinerary' in High Dutch. I should be glad to see your China

plants, though truly, sir, I cannot attend to anything long. I rest,

Sir,

Your very much obliged friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, October 10, 1701.

SIR,—The occasion of my giving you the trouble of a letter at present is to entreat your assistance in dispatching the inclosed to Dr. Preston. I am still busy in adding new species to my Supplement. Dr. Sherard hath lately sent me a parcel of about 230 dried plants, received from the Prince of Catholica, most of them new and unknown to me, all of them growing in the Hort. Cathol. I am able to make but slow progress, by reason of the pains and trouble I labour under. Our undertakers are very slack and remiss in printing this Supplement. The time is past when they should have published it, and they have not yet began it. I hear nothing of them. I have sent up to Dr. Hotton, at his request, a method of grasses, such an one as I was able to draw up in the circumstances I am now in. My wife and girls give you their humble services. I am not insensible of my obligations to you, and retain a grateful memory of them, though unable to make you any amends; and therefore must remain,

Sir,

Your most obliged friend and servant,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Derham.*

Sir,—I received yours of April the 24th last past, for which I return you thanks; and first, for your approbation of such books as I have published, though I dare not own any such worth in them as to deserve so good an opinion as you or others may have conceived of them. However, the more unmerited such commendation is, the more thanks I owe you and them for it.

2. For that particular and exact account you have given me of the appearance of an innumerable multitude of small frogs covering the highway, &c., I doubt not but had others, to whom the like phenomenon hath occurred, been as inquisitive and observant as yourself, they might have found out whence they came forth. Had I received this history before the last edition of my book of the Wisdom of God, &c., I could have made good use of it.

Your observations of the whole process of the generation of gnats, from the egg to their mature state, I should be glad to see. I have seen that water animalcule, out of which they immediately proceed, but never saw their eggs, or where they lay them. It is not many years since I applied myself to the observation and search of insects in order to compose a history of them, but now I am wholly taken off from that study by the afflictive pains I almost constantly labour under, by reason of ulcers upon my legs, I having not been half a mile out of my house these four years; and though I have made use of many means, and have had the advice of some of the most skillful surgeons and physicians, yet without success, growing yearly worse and worse. Besides, I have been very much haunted with a troublesome diarrhœa, frequently recurring, so that you may well think I can have but little heart to mind natural history; but yet I am so far engaged, that I cannot shake it off. I have now just ready to go under the press a third volume of the 'History of Plants,' being a Supplement to the two former

* The original is thus endorsed by Dr. Derham: "Received this May the 8th, 1702."

volumes, which hath engrossed almost my whole time for two whole years. Besides, I have a little book now printing at Leyden, in Holland, entitled 'Methodus Plantarum emendata et aucta.'

An account of your observations about other aquatic insects would be very acceptable.

As for books about insects written in, or translated into, Latin, I know none but Aldrovand, Mouffet, Johnson, and Goedartius, except Malpighius 'de Bombyce,' and Dr. Lister 'de Araneis.' The best general history or account of insects is that of Swammerdam, written in Low Dutch, and translated into French.

The small worm you mention and describe, I have often met with among the viscera and intestines of animals and elsewhere, but never attempted the discovery of its manner of generation, and do guess it would be a very hard task to find it out.

Your discovery of the long-beating death-watch I read the account of in the 'Philosophical Transactions,' soon after the publication of it, with great satisfaction; its noise is more agreeable to the leisurely and constant tick of the death-watch commonly observed than that of Mr. Allen's. It is time that I put a period to this letter, the remainder being only that I am,

Sir,

Yours in all offices of love and service,

JOHN RAY.

Dr. SHERARD to Mr. RAY.

SIR,—I forgot in my last to answer your query about corymbiferous plants. Mr. Bobart told me Dr. Tournefort's making *Bidens* a distinct genus was a false notion; for the seeds of those plants (as of many others of the *Corymbiferæ*) had each four spinulæ, though two of them generally fell off before they were ripe. He says all those that have quadrangular seeds have four spinulæ, which in many plants fall all off, in others only two remain.

London, June 11, 1702.

Mr. Ray to Mr. Derham.

Sir,—I find that you have been very curious in observing the generation of gnats, to which I must needs own myself to be a great stranger, having never seen any aureliæ of that insect but those with club-heads, whence I suppose our most common gnats come. Of the vermiculi or nymphæ, previous to these aureliæ, I knew nothing; and now I perceive that the change of one of these into the other is not instantaneous, by the casting of a skin, as the change of the aurelia into a gnat, but gradual, so that this seems to be a different sort of generation from the rest of this kind.

I think you need not doubt but that the perfect gnat lays the eggs in all these kinds, and that those that are fecund are rendered so by the coition of the male and female; for this is agreeable to the process of nature in the generation of all insects, none ever generating till they have run through all their changes. As for the suddenness of laying their eggs after their leaving the aurelia state, that need not startle you, for it is usual for many of them to couple and lay eggs so soon as ever they are come out; the females also may drop their eggs without any coit, if there be no male near.

From these different sorts of vermiculi and aureliæ doubtless do proceed various kinds of gnats, notwithstanding I find but two described in authors. Howbeit I think you mistake in charging Swammerdam with that error, for I find in my French copy of him these words: "Car nous en trouvons des plusieurs sortes." You will deserve well of those who apply themselves to the history of insects, if you shall find out, describe, and distinguish these species.

For my own part, I am now almost threescore and fifteen years of age, so that it is time for me to give over these studies and inquiries; and besides, I am so lame, and almost continually afflicted with pain, that I cannot

attend any study, being diverted by pain. It is true of late years I have diverted myself by searching out the various species of insects to be found hereabouts, but I have confined myself chiefly to two or three sorts, viz. Papilios diurnal and nocturnal, beetles, bees, and spiders. Of the first of these I have found about 300 kinds, and there are still remaining many more undiscovered by me, and all within the compass of a few miles. How many, then, may we reasonably conjecture are to be found in England, in Europe, in the East and West Indies, in the whole world. The beetles are a tribe near as numerous as these, and the flies of all sorts not fewer. I have now given over my inquisition, by reason of my disability to prosecute and my approaching end, which I pray God fit me for. You that have more time before you may profitably bestow some of your spare hours upon such inquiries, and may probably make useful discoveries, at least may reap a great deal of pleasure and satisfaction in finding out and bringing to light some of the works of God not before taken notice of. So I heartily bid you farewell.

Black Notley, June 30, 1702.

Note.—At the time when this letter was written I was but a novice in the history of insects, particularly of gnats, having begun my strict observations of them but the foregoing spring. In order to the discovery of the process of their generation, I shut up in glasses divers nymphæ and aureliæ of gnats, with the water in which they were produced; and after all the aureliæ were become gnats, and the nymphæ, aureliæ, I found there were other nymphæ succeeded; and, not having seen any eggs in the water, I very inadvertently concluded that those nymphæ, or at least the aureliæ (which I thought might be more perfect animals than I afterwards found them), might lay eggs, and be the parents of those succeeding nymphæ. But I soon found my error, and that what my friend Mr. Ray saith in this letter was true, and also discovered the whole process of the generation of gnats, and that this tribe of

insects is much larger than was ever imagined; for in the parts only near Upminster, in Essex, where I then lived, I discovered above thirty distinct species of them, both male and female most of them, and saw many of them in their coit, how they deposit their eggs, &c.

W. D[ERHAM].

Mr. RAY to [Mr. PETIVER?].*

SIR,—I thank you for the information and philosophic intelligence given in your last. I shall not at present answer to the particulars therein contained, because I am in some doubt whether this letter will find you in London. The subject of this is to acquaint you, that the undertakers for publishing my Supplement. Histor. will not begin to print till they have the whole copy entire delivered up into their hands (perhaps not then neither); yet, to take away all excuse and pretence of delay from them, I am resolved to satisfy them in this particular, and have done what I can toward the perfecting of it myself, so that I only want your and Dr. Sherard's additions and corrections; which cannot possibly so soon be prepared and entered in the body of the book, as that there will remain time enough to print it this summer, and therefore must necessarily be cast into an appendix.

As for what I have done myself, I have entreated Dr. Sherard to revise and correct it, expunging what is repeated, and adding what is wanting; with whom I pray you also to join, being the best skilled in Oriental and indeed all exotic plants of any man I know, as having seen various specimina of the same species in all their states, and a man of the greatest correspondence of any in England as to these matters.

The plants in your Centuries I would willingly but

* This letter is numbered in a series, in which are contained several letters addressed to Mr. Petiver, and it is probable, from their subjects, that they were all written to him.

dare not enter, for fear of mistakes, only such as you yourself have given me information of. Father Camelli hath not dealt ingenuously in delivering his icons and descriptions of trees to another, which he gave a kind of promise of. His icons and descriptions lying in my hand you may command, for what time you need them, for I have some thoughts of getting them graven by a subscription. It is now time to make an end, and assure you that I am, Sir,

Yours in all offices of love and service,

JOHN RAY.

Black Notley, —— 25, 1702.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Nov. 18, 1702.

SIR,—I have at last sent back all the books of yours I had in my hands, so far as I know. The Magellanic plants were of little use to me, most of them being imperfect specimens, and I unable to compare them with such as are already described or figured, or myself to describe them by reason of the pain I almost constantly labour under, which permits me not to attend anything for any considerable time. You formerly told me that you had some plants from China, which you promised to give me a sight of; and since, Dr. Sherard told me, that you had received another parcel thence, and promised to desire you to send me them. It is pity they should be wanting in this work. If you will do me the favour to lend me them awhile I will make hard shifts but I will give some short account of them and insert them.

I doubt not but Dr. Sherard hath acquainted you what overtures have been made for procuring and printing icons for my History of Plants, and how forward my Lord Bishop of London is in it, promising his utmost assist-

ance, and he is able to do as much as any man, by reason of his interest in the Queen. But I look upon it as not feasible in these difficult times, and therefore shall not concern myself much in it.

My wife tenders her humble service, and so do my girls. Both they and I are sensible of our obligations to you, and return you many thanks for your former kindnesses. So I humbly recommend to the Divine protection and blessing, and remain,

Sir,

Your very much obliged friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

SIR,—I received your kind letter of Dec. 9, for which I thank you. The method of insects was too small a tribe to have been taken notice of by you.

I should be very glad to see the collections both of insects and plants sent you by the learned and very industrious Father Camel, were I in condition to overlook them. His history of scandent plants are very well worth the publishing. The learned world must not want them. They must, I think, be printed by themselves: but, alas! I am in such sad pain and misery, and reduced to that extremity, that I cannot rise alone, and look upon myself as no man of this world. All I can do is to sit still, bemoan myself, and pore upon my pain. Father Camel's designs I intend to send you by next week's carrier.

Mr. Dale communicated to me as from you Mr. Cunningham's papers concerning the Catamba and Xylatoes, which were much to my satisfaction. I return you many thanks for all your assistances and contributions to my

Supplement, and for all your present literary communications, but, alas! I am in too miserable a condition to take notice of them all, and therefore here I must rest,

Sir,

Yours to serve you,

JOHN RAY.

Black Notley, Dec. 11, 1702.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Dec. 16, 1702.

SIR,—About the beginning of this session of parliament, I received a very courteous and obliging letter from my Lord Bishop of London, wherein, among other things, he desired me to send one of my friends to treat with him about the design of procuring figures for my History of Plants. Whereupon I wrote to Dr. Sherard, to desire him to attend upon his lordship for that purpose; but he, being one of the commissioners for sick and wounded soldiers, was sent to Portsmouth, where he still resides, so that he could not fulfil my request; yet I cannot excuse him for deferring thus long to give me notice thereof, the business requiring haste, and my lord advising that what is done would best be done while the town was full of nobility and gentry sitting the parliament.

Now, sir, understanding that you are acquainted with the bishop, I must beg the favour of you to attend his lordship, and to do that which I requested of Dr. Sherard, that is, to give him your opinion whether the thing be feasible, and what difficulties are likely to occur in it, and what is the best method to proceed in. I conceive the great difficulties will be in procuring gravers, and supervisors to make choice of the best patterns of plants that are already published, and get such delineated as they

can procure specimens of; and to superintend the gravers to see that they do their work well, and to put titles to the several sculps, &c. Such supervisors, I doubt, it will be difficult to find, and pensions or salaries must be allowed them. I was loth to give you any trouble about this affair, because I know you to be full of business, and to have but little time to spare, but I am constrained, Dr. Robinson excusing himself for not being acquainted with the bishop. I am in some haste, the messenger waiting for my letter, and so shall add no more than that I am,

Sir,
Your much obliged and affectionate friend and humble servant,
JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Sir HANS SLOANE to Mr. RAY.

SIR,—I received yours, and have spoken to the Bishop of London about the graving the plates for your History. He seems to be in very good earnest about it, and without question will be able to do very considerable matters in it; but I find Dr. Sherard and others think it impossible to be effected. I will inquire a little farther into it, and talk with Dr. Sherard, Dr. Robinson, and Mr. Petiver, &c., and then again discourse his lordship about it. I imagine it would be best done by sections.

London, Jan. 14, 1702.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, ... 1702.

SIR,—In one of your last letters you were pleased to tell me that you had a parcel of China plants which you would do me the favour to give me a sight of. Having now almost gone over Dr. Sherard's, I am ready to receive them; and therefore desire you would please to send hither so soon as may stand with your leisure and convenience. I am very listless, and unable to stir about and to turn over and search books, and so can make but poor work with new and nondescript plants, unless the specimens be very fair, which is the reason I can make but little use of your Magellan Straits' plants. My 'Methodus Plantarum emendata et aucta' is now printing in Holland, and almost finished, so that I hope shortly to have a copy to present you. I am highly obliged to Dr. Hotton for his pains and care in presiding the edition, and revising and correcting the proofs, so that I doubt not but the book will come out very correct. My wife salutes you with the tender of her humble service, with whom joins,

Sir,

Your most obliged friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Jan. 20, 1702.

SIR,—I received your noble present of sugar, highly valuable both for the quantity and quality, for which myself, wife, and girls return you our most hearty thanks.

I wish we were as well able as we are willing to make you some part of an amends; but we have no hope of that; so that for real favours we have nothing to return you but verbal acknowledgments.

I do also render you many thanks for attending my Lord Bishop of London at my request, to have conference with him about the subject of procuring plates for my History of Plants. For my part, I never thought of such a design, but some friends here were very earnest for it, and treated about it with the bishop without my knowledge, who showed a great inclination to me, and used many expressions of kindness, and was very forward to offer his assistance towards the promoting such a work; whereupon I could do no less than send him a letter of thanks, which he favorably accepted, and returned me an extremely obliging answer, wherein he desired me to send one of my friends to him to treat about that affair, and tell him what he should do in it; but I see there are so many difficulties that attend the management, that as I never intended it at first, so I am now very willing to lay aside all thoughts of it.

I have a small present for you, which I entreat you to accept as *magni affectus eriguum effectum*. It is my 'Methodus Plantarum emendata et aucta,' of which I have desired Mr. Smith to send or deliver you two copies, one in the larger, and the other in the common paper; but I am ashamed that I must put you to the charge of binding them, for they came to me in quires, and perhaps you will not find them worth the binding. The straitness of time will not permit me to add any more than that I am,

Sir,

Your most humble and very much obliged servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, ... 1702.

Sir,—I understand by Mr. Dale, not long since returned from London, that it is the opinion of my friends there, excepting yourself, that the design of procuring figures for my History of Plants is impossible to be effected for want of gravers, but especially supervisors. For my part, as I did not first set it on foot, so am I well contented that it be laid aside.

I suppose you hold some correspondence with Dr. Preston, whom, when you write to, I pray be pleased to tell him that my 'Methodus Plantarum aucta et emendata' is now published, and that I have a copy of it at his service, if I knew how to convey it to him, though I fear the charge of carriage would be more than the book is worth.

Mr. Dale tells me that some of my friends at London talk of imposing a new task upon me, that is, of describing such exotic insects as are found in the museums of the virtuosi about London, which, if there be no more able and better qualified person living in or near the city for such an undertaking, I should not be much averse from, if it please God to continue me any tolerable measure of health and ease, for that I may do sitting, and without much motion. But then they must be sent down to me by parcels. As for our English insects, I think I may, without vanity, say, that I have taken more pains about some tribes of them than any Englishman before me. If I were to publish a history of insects, in each tribe I would first place the English ones by themselves, and then the exotics.

I have by me a history of our diurnal English *Papilios* of my own knowledge, which I drew up some years since. They are in number about forty. I understand that Mr. Petiver hath several new ones sent him out of Cornwall,

which I suppose he will shortly publish. In case you think fit to employ me in this service, I would begin with the tribe of *Papilios*, because therein I have taken the most pains, though that be far from the first tribe; for I divide insects into *Apoda* and *Pedata*, and *Pedata* into *Pedata tantum*, and *Pedata* and *Alata simul*; and these last I would divide according to Swammerdam's method. Excuse this prolixity. I have now done, and remain,

Sir,

Your very much obliged servant,

JOHN RAY.

Mr. RAY to [Mr. PETIVER?]

SIR,—I have this morning, according to my promise, remitted your box by carrier. I intended to have taken some short notes of the rare and curious plants therein contained, but the weather fell out so extraordinarily sharp as confined me to the fireside, and utterly disabled me from doing anything of that nature. All that I could do was to transcribe your names, which contain such characteristic notes as will in some measure supply the want of larger descriptions. I now again renew my request to you to send me your Chusan plants, which I hope the weather will be so favorable as to permit me to compare with Dr. Sloane's, which I have by me, without names added. I am so crazy and pinched with the cold, that I must have done when I have told you that I am,

Sir,

Very much yours,

JOHN RAY.

Black Notley, Jan. 12, 1703.

Mr. Ray to Mr. Samuel Smith.

B. N., March 8, 1703.

Sir,—Since my last to you I have been brought even to death's door. Near a fortnight since there befel me a very strange accident; one of my small sores began to run with that extraordinary rage as no man could believe or imagine that had not seen it, and so continued night and day for five days together, till it had reduced me to that weakness that I was unable so much as to rise up from my chair, or move when I was up. All this while, besides my usual pains proceeding from sores, a fever attended me, which at last determined, at least much abated, in a plentiful sweat, so that you need not wonder I should be able to do so little in the Appendix.

I received the parcel you sent last week, and do thereby perceive that it will not be long ere the work be finished at the press; but then it will require some time to finish and transcribe the Index. Give my thanks and service to Mr. Petiver for his pains. I have sent you inclosed a paper of observations of the virtues and effects of some plants less known, which I pray see that it be inserted at the end of the first parcel of the Appendix I sent you.

I am at present in but evil case; and so omitting all matters of mere civility, shall only add that I am,

Sir,

Yours to serve you,

John Ray.

For Mr. Samuel Smith, Bookseller, at the Princes Arms, St. Paul's Churchyard, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, March 17, 1703.

Sir,—You may justly wonder I should detain your box of rare plants so long, and suspect that I never intend to return them back any more; and therefore I think

myself obliged to give you an account thereof. The Badminton plants I intended to revise carefully, and compare with those in my Supplement, and to have put the names to them I found. But, alas! the sharp cold brunt which happened in January gave me such a shock as utterly disabled me to do anything but sit still and pore upon my pain. And since, about three weeks ago, a strange accident befel me; one of my small ulcers all of a sudden bubbled up like a fountain, and ran at that rate night and day for five days together, as no man that had not seen it could have believed it; and in that time reduced me to that weakness that I could not rise alone off my chair, or stand alone when I was up. This was attended by a pretty smart fever, which determined shortly in a long sweat. Since this, another sad accident hath befallen me. A part of the skin of one of my insteps by degrees turned black, and now is, with the flesh under it, rotted and corrupted, which yet sticks fast and comes not off, yet runs a copious gleet.

As for your Chinese plants, I intended to have compared them with Mr. Petiver's Chusan plants, and wrote to him to send them to me, but he hath not been pleased to do it; and yet had he sent them, I have not hitherto been in case to compare them. I should do nothing more willingly than serve you in anything in my power; though this doing I should rather serve myself, by improving my little skill in botanics, by the addition of so many new and nondescript species which you have pleased to communicate the knowledge and sight of to me. I am sorely afflicted with pain, and scarce know what I write. Yet so long as *spiritus hos regit artus*, I shall remain sensible of all your favours, and,

Sir,

Yours in all service,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Mr. Derham.

Sir,—I received yours of the 19th, for which I thank you and acknowledge myself much obliged to you for being at the expense of so much time and pains to gratify me. What you have been pleased to communicate concerning the sudden appearance of a vast multitude of small frogs, and the account you give of the place where they were generated, and whence they did proceed, I have written out and sent to London to be inserted in this last edition of my Treatise concerning the Wisdom of God, &c., as also what you have imparted concerning the use of those extremely small water insects or animalcules.

As for the History of Insects, I intend not a general one, but only of such as are native of England, adding such exotics as are found in the museums or cabinets of the curious about London or elsewhere. Neither yet can I hope that all that I myself have observed, or shall obtain from friends, will amount to the fifth part of the species that are native of this island. I have, for some years together, been a diligent searcher out of Papilios diurnal and nocturnal, and though I have found and described near 300 species, great and small, of that tribe or genus within the small compass of four or five miles, yet came I not to the end of them, so long as I prosecuted that inquiry, but every year afforded me new ones. Now the genus of beetles is as numerous as that of the Papilios, if not more. The flies (so at present I call all insects that have naked and smooth, not farinaceous wings), both bipennes and quadripennes, are in a manner infinite, nor hath their history been with diligence prosecuted by any man that I know of, except Mr. Willughby, whose manuscript I hope to procure.

I cannot but admire your industry and patience, in searching out and observing the various species of gnats, with the manner and process of their generation, and the success you have had in discovering them, which may

encourage you to proceed in such inquiries, to which you are so well qualified, and, if I may so say, gifted: for I look upon such a sagacity in searching out, and happiness in finding, new things as a gift of God. Were there but a sufficient number of such men, who would apply themselves to the prosecution of the history of insects, much might be done in it, and many rare discoveries made. I cease to give you further trouble, and rest,

Sir,

Yours in all offices of love and service,

JOHN RAY.

Black Notley, March 31, 1703.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, March 29, 1703.

SIR,—I received your extremely kind and compassionate letter, and return you most hearty thanks for it. I am fully of your opinion that my case is scorbutical, and that my sores, as they are now, are in a great measure the effects of that distemper; and therefore do highly approve of your advice, and resolve to follow it. Sir Thomas Millington, about two years since, did me the honour to make me a visit here, and, discoursing concerning my ulcers, he told me that he believed no outward application would do me any good, and therefore advised this diet-drink: take water-cress, brooklime, plantain leaves, dock roots, and a few alder leaves: boil these in wort instead of hops, and work up the liquor in a vessel, and use it for my ordinary drink. This I did once, and received some benefit by; but the winter coming on, and little virtue in the herbs, I gave it over, especially not finding that sudden amendment that I expected; but I shall not be so unconstant in the use of your prescriptions. I cannot but wonder at what you write about the danger of leading me to a dropsy. I have been myself in some fear of that disease this year and a half, my legs and feet

swelling and pitting; but because the swelling did not grow upon me, I imputed them to the bandage which I used.

I have this morning sent you, by carrier, the box of rare plants you were pleased to lend me, and am sorry I was not in case to use them. I hope they have received no great harm.

My wife is very much your servant, and in great admiration of your extraordinary kindness to so mean a person as is,

Sir,

Your highly obliged and most humble
servant and orator,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, April 14, 1703.

SIR,—I have sent you this morning *Hyacinthus ambrosinus*, which I now find to be yours, and am sorry I should be so careless and forgetful as not to send it with the last books, which inadvertently I thought and wrote were all of yours I had in my hands.

I give you most hearty thanks for the kind and generous offer of the use of your exotic insects to describe. I have not yet begun what I intended upon that subject, expecting Mr. Willughby's collections from Sir Thomas W. I shall not pretend to a general history of insects, but confine myself to those that are natives of our own country, and such exotics as are in the museums and cabinets of yourself and other curious persons about London and elsewhere in England, so far as I can procure them. When I have done my best, I believe all the species of British insects which I have observed myself, or shall procure from friends, will not amount to the fifth part of

those that are here bred. My wife and girls give you their very humble services. Excuse this unnecessary trouble, and pardon my forgetfulness in thus long detaining your book. I am,

Sir,

Your much obliged servant and humble orator,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, these present, London.

Mr. RAY to [Mr. PETIVER ?]

SIR,—It is now a long time since you were pleased to send me your large and instructive contributions to the first four tribes of the Supplement to my History of Plants, with promise to do the like to the succeeding tribes, which would have been of great advantage to the work; but either you forgot your promise, or were so interrupted and diverted by multiplicity of other business, that you could not find time to attend and make it good. However, it is not yet too late to insert such additions and observations as you think good to communicate in the Appendix; by which you will reap this advantage, as to have all that is yours put together and known to be so, and so to lose no part of the honour due to you for any of your observations and discoveries. If you please to draw them up yourself, and deliver them to the printer, you will save an infirm and crazy person some pains; if you think better that I should do it, be pleased to send them to me.

Something further I have to communicate to you. I am advised by some of my friends to describe such exotic insects as are in the hands of the virtuosi in and about London, which, God granting life and any tolerable measure of ease (which I can hardly expect), I am not

averse from doing. Of such insects I suppose you are of any man best furnished with variety of species. I am likewise about drawing up a history of all the British insects which have been either observed by me, or shall be communicated by friends; all which I conceive will not amount to the fifth part of the natives of this island. I hear that you have several new ones of the Papilionaceous tribe, sent you out of the west of England, which I should be glad to see. I was told by Mr. Breynius, who did me the kindness to give me a visit here, that you had not been well lately, which I was sorry for. I can heartily condole with friends, myself being not insensible how uneasy a state of pain and sickness is. I wish you health for the future, and rest,

Sir,

Your faithful friend and servant,

JOHN RAY.

Black Notley, April 24, 1703.

Mr. THORESBY to Mr. RAY.

Leeds, April 27, 1703.

HONOURED SIR,—This additional list of local words is larger than I expected, and therein you will quickly observe several words already inserted in your very curious and accurate collection; but then it is either when the same word has a different signification (which is not uncommon) or pronounced after so different a manner, as considerably to alter the orthography; or lastly, when the etymology has fallen in my way in the perusal of some of our Saxon authors, as Wheelocks, Bede, Somner, Spelman, Hicks, &c.

I am tempted to think the German Silk-tail [*Bombycilla garrula*], registered in the Philosophic. Trans., No. 175, is become natural to us, there being no less than three killed nigh this town the last winter:—

Alack for alas.
Alas-a-day } Alas, a form of pitying.
Alas-at-ever }
After-maths, q. after-mowings, the grass in the meadows, that grows after the mowing the eddish; roughings we take for that rough coarse grass the cattle will not eat.
Arls or *Earls*, earnest.
An *Arvil*, a funeral treat; the word and practice retained in the Vicarage of Halifax. I was at one for an ancient minister a few months ago.
As or *Asse*, ashes, var. dial.
As tite, as soon; *titter*, sooner.
An *Ashler* wall, freestone hewed with a mason's axe into smoothness, q. Axtler.
Aud-farand, out of fashion when applied to elder persons; and witty above their age, when to children.
Aukardly, opposite to towardly.
An *Awmoss*, alms, from French aumosnes.
Awn, own, var. dial. As azen.

Backus, bakehouse.
Very *Bain* about one, officious, ready to help.
Bang his *Banes*, beat his bones.
Bawks, the large timber beams that support the roof by sign-trees, under the side-wavers, and a prick-post under the rig-tree, summers or summer-trees are never contiguous to the roof, but only the main-beams in a chamber-floor.
Bannock, &c. *Tharfe* cakes.
A *Barn*, a child, S. beapn, Matth. ii. 18.
A *Barn*, a garner, S. Matth. iii. 12.
A *Barr*, a gate of a town or city, Mickelgate, from S. mycel, not St. Michael.
Bawt, without.
A *Bawl*, bowl.
Beiling, matter mixed with blood running out of a sore.
Beneson, benediction.
A *Benkit*, a small wood vessel with a cover that is loose, and fitted with notches to two prominent legs that have a string through them to carry it by.
To *Bezle*, waste, embezzle.
To *Bid* or *Bead*, to pray, from S. beaþe, oratio.
To *Blare*, to put out the tongue.
To *Blate* or *Bleit*, proper to a calf's or sheep's voice.
Bleak, exposed to the weather; it stands bleak.
A *Binding*, a hazel rod, or thorn, two or three yards long, so called, because used for binding the hedge-tops.
Blew Milk, skimmed milk.
Blind-mans-buffe, a play.
Bloa, black and blue.
A *Blowse* or *Blawze*, proper to women; a blossom, a wild rinish girl, proud light skirts.
A *Bloated* look, a bloa, dusky, dark countenance, caused by intemperance mostly.
To *Boken*, to nauseate, ready to vomit.
The *Booght* of the elbow.

Boons or *Booyns*, fowl, and sometimes labour, to be given to the landlord, over and above the rent, from the French boon.
The *Boyt* of a tree.
A *Booyse*, or *Buyse*, same as boose or stall.
Brakons, fern, brakes.
A *Brandred* or *Rid*, a trivet, or iron.
You *Braid* of the miller's dog.
Bown, as whither art thou bown, i. e. going or bound.
A *Breid*, a shelf, or board, var. dial.
To *Breiden*, to spread or make broad.
A *Brock*, a badger.
A *Bridle-sty*, a way for horse only, not cart or carriages in common.
A *Broych*, a small spike of iron or wood to put coppins on.
To *Broych*, or broach, as masons an atchler, when, with the small point of their axe, they make it full of little pits, or small holes.
To *Bruzzle*, to make a great ado, or stir.
A *Bumper*, a glass or mug brimful.
A *Bur-tree*, an elder or dog-tree.
A *Burk-tree*, or rods, birch, var. dial.
Bytte (Warwickshire) a bottle or flagon, ab S. byττe, uter, dolium.

To *Cadge*, a term in making bone-lace.
A *Cankerd* cart, or froward fellow.
To *Cape* a wall, to crown it.
A *Carding* of wool.
A *Caw*, cow, var. dial.
A *Cawl*, or *Coul*, a lump rising in the head through a knock.
To *Caure* down, to ruck down.
To *Cast* or *Kest*, to vomit.
A *Caup*, as a muck caup.
A *Chare*, or *Char-woman*, one hired by day (not a fixed servant) to wash.
Chaffer, to chaffer, exchange.
To *Chase* a laughter.
Chid, rebuked, S. cιδe.
Chizzel, wheat-bran.
To *Clatter*, make a noise, talk fast and loud.
A *Clawt*, a tattered cloth, or rag.
Cleam'd, daubed on as with a trowel.
Clem'd, or *Clam'd*, pined, hungered.
Clinch, or clunch-fisted, covetous.
I'th' *Clout*, drunk.
A *Clughe*, a valley between two steep hills.
Clumps, bungling.
Clukes, clutches.
Clots, clods, var. dial.
A *Clumpst* fellow, i. e. plain-dealing, that speaks at the mouth, Prov.
A *Clunter*, an unnimble stumbler.
Coap, fight.
Cobby, saucy.
Coits, Coats, var. dial. Thou'rt a lad i' coits, spoken to men ludicrously.
Coddy, joined with little, to diminish, as a little coddy lamb, bird, fly — is exceeding little, perhaps but a var. dial. for conny.
Cokend, choked.

Com, came, S. com, Matt. ii. 21.
To *Con*, i. e. ply a lesson as schoolboys.
A *Coppin* of yarn.
A *Cottrel*, a piece of iron with a hole in to fasten.
A *Cragg*, a stony, rocky bank, &c.
A *Dish Cratch*, same with the cradle.
Crawse, jolly, brisk.
To *Creak* as a door.
Cree'd Wheat, hulled and boiled.
To *Crinkle*, to crouch, to yield sneakingly.
Cowks, or cinders, coals burnt in common fire, not charred.

To *Daker*, to work for hire after the common day's work is over, at 2*d.* an hour.
To *Darne*, i. e. sow up holes, so as not to pucker, but fill them up.
A great *Deal* or *dele*, S. Sælar parts, Matt. ii. 22.
To *Deeght* ing, spread mole-hills.
To *Dither*, to quiver with cold.
A *Dingthrift*, a spendall, prodigal.
To *Dizen*, to be curious and look big, to sit in state, as if great.
Dodges on, keeps poorly doing.
Dog-tree, elder.
A *Dole*, *Dool*, or *Doal*, a share or part in a townfield; also money or bread distributed at a funeral to the poor.
To *Dree*, to be able to go through to the end of the journey.
A *Dribble*, an iron pin that carpenters use to drive out wooden pins.
Drigh, long, tedious.
A *Dubler*, a platter.
A *Dub*, a puddle, or plash of water.
The *Dule*, devil, var. dial.
He *Dung*, or *Dang* it down, threw it down.
To *Durse* is to dress; to durse the house, horses.
To *Durse* the ing, to spread the molehills and dung that is in fields.

Mine *Eam*, my uncle, S. eame, avunculus.
For *Eance* (once) and use it not.
An *Eapus*, hands full.
Earnder, forenoon drinking.
Edge you brethren, make room, give way.
Een for eyes.
To *Eek*, enlarge, S. ican augmentare.
Een for even, var. dial.
To *Elt*, to beat in the dough with more meal and yeast.
Mirk i'th' *Eemin*, dark in the evening.
Een, evening, *per Aphæresin*.

The *Fag* end, the hinder or latter end.
F' *Fake*, Faith (an oath).
Far, for farther, as the far bank.
Fastne's een, the Tuesday before the *Dies Cinerum*, or Ash Wednesday.
Fat (in composition), vessel, as in guile *Fat* ab S. pat, vas.
Faugh, fallow ground.
To *Faugh*, to plough, and let it lie fallow a summer or winter.

Faw, } foul, dirty.
Fawl, }
Fear'd, frightened, afraid, S. afæred.
Feer, or *Fere*, wife, S. ȝefera, socia.
To *Fest*, i. e. put out apprentice.
To *Fitter*, to kick smartly with the feet, as children do when pettish, metaphorically to be in a passion, a pelting chase.
To break or tear all to *Fitters*, is to reduce to the smallest bits.
A *Filly-foal*, from S. fyltan to follow the mare.
A *Flacket*, a wood or leather vessel.
A *Flask* for water to wash in, ab S. æscen flaxan.
To *Fling*, to throw.
To *Flire*, or *Flear*, laugh scornfully.
Flaughter'd, affrighted.
A *Fleyk*, a hurdle made of hazel, or other wands radled, for the clothiers to swing or beat their wool upon.
He *Float* me, chid or scolded.
Flue-full, brimful, flowing full.
A *Flurts*, a light housewife.
Yau'r mains *Flush*, full-handed, prodigal, wasteful.
To *Fodder*, i. e. give hay or straw to cattle.
Fogg, or *Edish*, is the second growth of grass (after mowing).
To *Foreheight*, predetermine.
A *Fodder* of lead.
Forspoken, bewitched, forespoken.
Frayn, (Lanc.) ask, S. begnan, interrogare.
Freem, handsome.
A *Frosk*, frog.
A *Fruggan*, applied to stirring women.
To *Frust*, trust for a time.
Fulsum, nasty, foul.
Fur, far, var. dial.
A *Fur* or *Foor*, a furrow.

To *Gang*, to go, S. gangan.
Gant, lusty, hearty and healthful.
Gar'em ken us ale, prodigious strong, make them know us.
A *Garsom*, a foregift at entering a farm, a Godspenny.
To *Gaup*, to stare about with open mouth.
A *Gauster*, a hearty loud laughter.
A *Gawd*, a guise, custom, fashion.
Gawk hand, } left hand.
Gallock hand, }
Gawa, go we, let us go.
Geen, given.
Gemean mather, the common sort, S. gemæne, Matt. viii, 29, from whence the present Dutch Gemeyn, common, vulgar.
Gestings, q. *Geestlings*, young geese.
Gif, if, S. gif, si.
Do you *Gawm* me, understand, or mind me.
A *Gladden* is a void place, free from encumbrances.
To *Glawm*, to look sad.
To *Glee*, to look asquint. (Yorks. as well as Linc.)

To *Glizzen*, glister or sparkle, as stars in frost; it freezes hard, and een glizzens, (in which sense alone it is used).
Gloppen'd, surprised.
To *Glore*, to look staringly.
Goyts of mills, where the stream passes out.
To *Graw* before the ague fit.
Graut, wort, sweet drink, ale before it is wrought with barm.
Greese, or *Greece*, stairs.
The *Groyn* of a swine, the snout.
A *Groop*, the hinder part of the mystall, where the cattle dung.
Griesly, ugly, grisled.
Guizend, oddly and sluttishly habited.
A *Gyste* for cattle, to be pastured.

A *Hackstaver*, hasty, slovenly fellow, both in habit and deed; but it has a peculiar respect to speaking ill, naturally or morally.
To *Haggle*, to cut irregularly.
A *Haking* fellow, an idle loiterer.
Hala, bashful, nicely modest.
Hame, home, S. ham.
Happens, perhaps.
Hard, for covetous, and in some places for half drunk.
Harenut, earthnut.
Harns, brains (Yorkshire).
Havers, manners.
To *Heald*, to lean to one side.
A *Hebble*, a narrow, short, plank-bridge.
The *Heck* is ordinarily but half a door, the lower half.
Hen-harrow, a kind of kite harrier.
To *Hent*, to catch a flying ball.
Height, called, &c.
To *Height*, to threaten.
To *Higle*, to loiter long in buying.
Hineberries, raspberries.
Hippins, steppings, large stones set in a shallow water at a step's distance from each other, to pass over by.
Hitter, eager, keen.
Hoast, cough, à S. þpoſta.
A *Hoppet*, a seed basket; also that in the mill in which the corn is put to grind.
A *Hooyze*, a half cough, proper to cattle.
A *Host*, a cough.
A *Hullet*, (a howlet) an owl.
To *Hype*, to gird at, to cast out disgraceful words.
A *Hott*, a wood, S. þolt, sylva.

An *Ing*, a plain even ground (mostly meadows) by the waterside.
To dress the *Ing*, that is the molehills, and dung, which is durst or drest, i. e. spread abroad with an ing-rake.
An *Inkling*, an intimation, or notice.
An *Ize-bone*, the huckle-bone, the coxa.
A *Junket*, a wicker long wisket to catch fish.

To *Keive* a cart, whelm on one side.
A *Keiver*, a bumper, or brimmer of liquor.
A *Kilt*, a milking or water-pail with one or two ears, with or without a cover.
A *Kiting*, a term of reproach.
It stands *Kittle*, i. e. ticklishly, ready to fall.
Knogs, nine-pins.
A *Konny* thing, a little, as well as a fine thing.
A *Kivver*, or *Kimlin*, a powdering tub.

To *Lag*, to come last behind, as if tired, flag.
Laird, (Scoticè) lord, S. ꝑlaꝑoꝛꝺ.
To *Lake*, play.
Lang, long. var. dial. S. ƕanȝ.
Langholds, spaniels upon horses' feet, fastened with a horse-lock to keep them from leaping wrong.
To *Lane* nothing, to conceal nothing.
To *Lant* ale, to put urine into it.
Laughter, laying as a hen lays her laughter, that is, all the eggs she will lay that time.
To *Lawk*, i. e. weed corn.
Lass-a-day, (alas!) an expression of condolence.
I'd as *Leive* do so, as willingly, it is equal to me.
Leathwake, limber, pliable.
Leasing, lying, à S. leaꝛunȝ, mendacium.
Leath, ease or rest.
Leer, laugh deridingly, flear.
Leet you, pretend.
Ley, fallow ground.
To *Leyse*, to pick the slain and trucks out of wheat.
A *Libhorn*, a sow-gelder.
To *Litt*, to colour or dye, whence the name *Lister* or *Litster*.
Listring, thickening, (Yorkshire as well as Ches.)
To *Loup*, or *Laup*, to leap.
To *Lug*, to pull one by the hair, or ears, lugs.
A huge *Lunshin* of bread, a large piece.

Maine, as by might and main, S. mæȝen.
To *Maine*, to lame.
A *Malkin*, a cloth at the end of a pole, wherewith, whetting it, they cleanse the bottom of the oven; applied to a slut.
Mare, more, var. dial., S. maꝛe.
Mate, match.
My *Maugh*, my brother-in-law.
A *Mawkin*, a dirty frow.
Mawm, tender, friable, short, mellow.
A *Mazed Goose*, applied to a person astonished, amazed per aphæresin.
Meedless, without measure.
Just *Meet*, exact.
Meeterly, indifferently, meeterly, as Megge Rylay danced.
Mensfull, neat and clean.
Menya,, a family, a house menya, S. Ꝑemo, Matt. viii. 1.
A *Midge*, no gnat, but the smallest of all flies.

Millums, watery places about a mill-dam.
A *Minstre*, cathedral, S. Mynstre, Chri.
Miscryed, discovered.
It *Mizzles*, rains small, like the falling of a mist.
To *Mobb*, to dress awkwardly.
A *Mooßn*, a wheat cake, baked upon a bake-stone over the fire, as oat-cakes.
Moolter, toll of a mill.
A *Miln* and *Milner*, for a mill and miller.
Welnee Moyder'd, almost distracted.
To *Mooysen*, i. e. wonder, from musing.
Mucky, dirty, as the streets in rainy weather; muck, towngate mire, as well as dung.
It *Muggles*, rains small, mist-like.
Munsworn, foresworn.
Munt, hint, as I know your meaning by your munting.
Mystall, mewstall for cattle, oxen, and cows.

Nar, nearer.
A *Nawt-heard*, neat-herd.
Nawt-foot-same, the oil or grease that is boiled out of a neat's foot.
A *Neave*, a fist.
I did not *Neigh* it, came not nigh it.
My *Neame*, or *Neme*, my uncle.
To *Net*, to wash clothes, give them a net.
A *Nether*, or *Nedder*, an adder à S. nædre, Matt. iii. 7.
Nifles, are glandules, kernels, which being hid and covered with fat, perhaps might either be denominated from, or denominate covert and secret filching of things, *Nifling*, *Nifle*.
Nise, strange, nice work, strang.
Nise, applied to a person, is precise, opposite to free and hearty.
He *Nim'd* it, took it, S. nim, Matt. ii. 20.
Nogs, shank-bones, hence playing at nogs, or nine-pins, because the bones of the shanks of cattle are used therein.

Onters, many onters, pretences, allegements, scruples.
An *Oskin* of land, an oxgang contains ten acres in some places, in others sixteen, eighteen, twenty-four, and fifty in some part of Bradford parish.
Ossell, perhaps.
Ounsel, a title of reproach, sometimes applied (as by Mr. Garbut, in his 'Demonstration of the Resurrection of Christ') to the devil.
Ournder, afternoon drinkings.
An *Ows*, an ox.
An *Ox-Boyse*, an ox-stall, à S. boþ, præsepe, a boose.

A *Paddock*, or *Parrock*, a small narrow close, that is an appendix to a greater, for the most part.
Pan, that described as the pan in a building, is properly the wall-plate; the pan is that piece of timber in wooden houses that lies upon the top of the posts, and upon which the balks rest, and the spar-foot also.
Parrisht, starved with cold, qu. perished.
Pash, I'll pash thy harns out.
Pat, fit, proper, pat to the purpose.

To *Pee*, is also look near and narrowly.
Peel the pot (cool it), with the ladle, taking out and pouring in again.
Peil, stir, what a peil keep you?
Perepoint, a perepoint wall made of a thinner sort of hewn stone, set upon the edge.
A *Pig-tail* candle, the least, put in to make weight.
A *Plat*, a place.
Pock-arr'd, marked with the smallpox.
To *Poyt* the clothes off.
A fire *Poit*, an iron to stir up the fire with.
A *Prigge*, a little brass skillet.
To *Pucker*, to draw up like a purse, unevenly.
A *Puddle*, a fat body.

Quite for wholly is general, for quit, Northern, 'twill not quit cost.

Radlings, hazel or other boughs, put within the studs of a wall to be covered with lime or mortar.
A *Rawp*, a hoarseness.
To *Raume*, to reach.
The *Reefe*, the itch; *reefy*, itchy.
To *Reek*, to smoke, à S. ręc, smoke.
What a *Reuls* here? } i. e. work, mad work.
You make a nise *rent*. }
Rinish, wild, jolly, unruly, rude.
A *Riggald*, abusively, applied to men as well as to cattle.
Roky, misty.
To *Rooyse*, to extol.
A *Roup*, a hoarseness.
Rudd, red stone.
A *Rudle*, a riddle.
Ryndta, used to cows to make them give way and stand in their stalls or booyses.

I *Sagh*, I saw.
Samme milk, butter in the churn, after the milk breaks into butter, à S. rammam, conglobare.
Saur, sour, mend like sour milk in summer, Prov.
Sawl, soul, var. dial., S. razel.
I'll *Saul* him, beat him.
To *Sawce*, *Rustic. pro* sowce, box the ears.
To *Scream*, cry aloud.
Scruby-grass, var. dial. for scurvy-grass.
Scug of a hill, the declivity or side.
Seaves, pilled rushes, of which they make seav candles.
Sel, *Seln*, self.
Sere, several, *sere ways*, several ways.
A *Settle*, a seat, à S. rętl.
To *Shaffle*, a *Shaffles*, a bungler.
To *Shale* (proper to the feet), in with the heels and out with the toes.
No *Sheds*, no difference.
To *Shill*, as peas, to take them out of the swads.
A *Shive* of bread, cut off the loaf.
Shoe, or *Shou*, *illa*, she, var. dial.

Shooen, or *Shune*, shoes.
Shool, shovel, var. dial.
Shooyts, shovel-board, where the shillings are directed as at a mark in shooting.
Cow *Sharn*, or dung.
Shrogs, a company of bushes, of hazel, thorns, briers.
The *Sile*, used in straining milk.
It *Siles*, i. e. rains fast.
To *Sipe*, to let all the water or liquor out which cleaves to the sides of a vessel after the main is poured out.
Skath or *Scath*, loss, S. à Sceaþe, nocumentum, as the scath came in at his own fence, Prov.
A *Skeel*, a kit or milking-pail.
Skeller'd, warped—Yorkshire as well as Derbyshire.
Skeer the esse, *vide* esse.
Skanskback, easily knowable, having some special mark.
To *Skimmer*, shine, look bright.
A *Slamtrash*, a slovenly dirty person.
To *Slap* one, i. e. beat, à sono verborum, vox ὀνοματοπ.
To *Slart*, to plash with dirt.
To *Slap* out the tongue.
To *Sleat* a dog.
Slim, sometimes signifies crafty, knavish, a slim customer.
To *Slive*, to clear, to rive.
A *Sliving*, a lazy fellow.
To *Slot* the door, to bolt it when shut.
A *Slough*, a watery boggish place, item, the cast skin of a snake.
A *Slush*, wasteful.
To *Slush* through work, to do much, but slimly, carelessly.
A *Smithy*, a smith's shop.
To *Smoar*, to smother, per contrac.
To *Snaffle*, to speak through the nose.
A *Snaffle-bridle* or *Bit*, snape bit.
A *Snap*, a lad or servant, now mostly used ludicrously, à S. Snapa, puer, Matt. viii. 13.
To *Snattle*, to linger, delay, magno conatu nihil agere.
To *Snavle*, snivel, speak through the nose.
Snever, slender, smooth.
To *Snift*, to draw the wind smartly up the nose.
A *Snicket*, one that pincheth all to nought.
To *Snite*, is to blow the nose; to wipe, is to dry it.
A *Sod*, a turf, is thin and round, or oval, taken from the surface of the earth; a sod thick and square, or oblong mostly.
Soncy, cunning.
To *Sonter*, to loiter, a *santering* or *sontring* body, one that squanders the time in going idly about.
To *Sosse*, proper to dogs.
To *Souse* or *Sawse* on the ears, i. e. box.
Snuffers for the nose, or nostrils.
A *Spaniel*. *Qu.* If not the S. name for N. Langholds, we have in these parts no other name but *Cow-ty*.
To *Sparkle* away, disperse, spend, waste.
To *Speer*, inquire the road, à S. Spynian, scrutari.
A *Spelk*, a wooden splinter tied on, to keep a broken bone from bending or unsetting again.

Spick and span new, that has never been worn.
To be *Spurr'd*, is to have the banns of marriage asked.
To *Squat* down, to cower down suddenly.
A *Stawk*, i. e. stalk of plants.
Stark, stiff, weary; also covetous.
Staupings, winter steps, the holes made by the feet of horses and cattle in miry highways and other places.
Stavers, hedge-stavers, i. e. stakes.
Stav'd, *stawv'd*, as a hedge that is cut.
To *Steim*, to bespeak a thing.
Stevon, a strong-sounding voice. à S. Stefn.
A *Stiddy*, an anvil.
A *Stigh*, a ladder.
Storcks Bill, to *storken*, proper to fat growing cold, and so hard.
Stowd, cropped as horses' ears.
Stradling, strutting and striding.
Strea, straw.
To *Streik*, stretch out the limbs.
A *Stroak* of corn with us is but half a bushel, or two pecks.
A *Stroom*, *Strawm*, the instrument to keep the malt in the vat, that it run not out with the liquor.
Strunted, cut off short.
A *Swaithe*, the row of grass cut down with the scythe. Laid o' th' *swaithe bank*, is spread abroad.
Swamous, modest.
A *Swamp*, a boggy bottom, a soft rushy piece.
A *Swatch*, a shred of cloth.
To *Sweal*, as a candle with the wind.
A *Swine-coat*, hog's-stye, à S. Lorc, domuncula.
To *Swinge*, scourge, à S. Spingan, to thresh.
To *Switch* a hedge, i. e. to cut off the outlying boughs.
To *Swither*, to singe.

Taplash, small beer, or thin drink.
A *Tarrant* (*forte pro* tyrant), a crabbed froward fellow.
A *Tavern*, a cellar.
To *Tawr* with the hand.
A water *Tawv*, a swooning fit.
A *Teathy* body, peevish, crabbed.
A *Teeming*-woman, i. e. child-bearing woman.
A *Tether*, tedder, var. dial.
Thar-cake, or hearth-cake.
Tharms, pudding-skins.
Thaw, thou, var. dial.
To *Thoyl*, afford.
To *Thraw*, to turn wood with a tool.
A *Threave* of straw, a burden of it.
A *Thwang* for a shoe, the latchet, S. Spang, a thong.
To *Tifle*, to stifle, overset.
A *Tifled* Horse, when broken above the loins.
To *Tipe* over, fall, or overturn.
Tiper-down, strong drink, for tiping over.
Tipsy, almost drunk, from tipling.
Titter and better, sooner.

To *Topple* down, fall.
Toota well, very well, too too well.
A *Tooming*, wool taken off the cards.
Topsy-turvy, upside-down.
Trawth, as faith and trawth, S. Treopðe, fides.
A *Trippet*, a quarter of a pound.
To *Trush*, to run through all the dirt, à sono, ὄνομ.
To keep *Tutch*, to be as good as the promise.
Tuta, too too; thou'rt tuta earnest, clamorous, covetous, importunate, unsatisfiable.
Turlings, coals about a fist's bigness.
Twills, quills.

Uncouth, strange, uncommon, unusual, à S. uncoð, unknown.
An *Urchion*, a hedgehog, urchin.
Uvver, for upper, or over, var. dial.

Varsall, universal.

A *Waag*, a lever.
To *Wade* the water.
Wae'st heart, a condolence to the same purport with
Wae's me, woe is the heart, &c.
To *Waite*, to blame.
Walker's earth, for scouring cloth.
A *Waugh-mill*, fulling-mill.
Waugh, insipid, unsalted, and so unsavoury.
The *Wawks*, or corners of the mustachios.
Wamb, womb, var. dial. S. pamb.
Wane, decline; the moon is in the wane. S. panian, minuere.
War, stand aside, give way, beware.
Warld, i' th' varsal warld, universal world.
Warse, worse, var. dial.
To *Wax*, grow, S. peaxan, crescere.
A *Wee-bit*, a tiny wee-bit, a small piece (a pure Yorkshireism).
Weet, i. e. wot, know, I weet full well.
Weeting, urine.
Weiky, moist.
To *Ween*, think, à S. penan, opinari.
Welling, boiling.
To *Welt*, to totter.
To *Welt* or *Wolt*, overturn cart or wain.
Wellanceering, alas.
Wel-nee, well-nigh; it's wel-nee night, almost.
Wesh, or wash, urine.
To *Whakker*, tremble, shake every joint.
Whaint, strange, odd, implying naughtiness, whaint wark.
A *Whamire*, a quagmire, var. dial.
Whawm, *Whelm*, overwhelm, is whawmed over.
A *Whein*, a quean.
A *Wheel-pit*, whirlpool.
Wheemly, neatly.
Whak't, for quaked, whence.
Whakers, for quakers, *le trembleurs*.

Whart, quart; meit m' a whart o' ooyl, i. e. measure me a quart of oil.
Whilk, which, S. philc.
Whilkin, whether.
White, for quit; it will not white cost.
To *White*, to cut sticks with a knife, and make them white.
Whiskin or *Whisking*, adjectively is great, applied to almost anything, as floods, fire, winds.
Whisking is also switching; there will be whisking for't, also beating, swinging, whipping.
Whreak, to speak *in gutture*, and whiningly.
A *Why*, an heifer.
Wight, swift.
Wind-raw, grass or hay raked into long rows for drying.
Wine-berries, not grapes, but gooseberries, pin-berian, Matt. vii. 16.
A *Wither*, strong fellow.
A *Wogh*, any partition, whether of boards or mud-walls, or laths and lime; as a boardshed-wogh, studded wogh.
A *Woggin*, a narrow passage between two houses.
To *Wolter* (as welter).
Wormstall, shelter for cattle in hot weather.
Wote, know.

To *Yall*, and to *Yawl*, or *Yowl*; the latter appropriated to dogs, the former to bawlers. In yall the *a* sounds as in that, in yawl as in the rustic caw for cow.
A *Yawd*, a horse.
Yeast, barm.
To *Yeather*, to beat with a long hazel, thorn, &c.
Yeeke, itch.
Yield, i. e. reward.
The *Yeender*, or *Earnder*, the forenoon, Halifax, in Yorkshire.
Yew, you, var. dial. S. *gep*.
Yews, for ewes.
Yooyle, yule, *de Yule*, vide Mareschalii Observ. in Version. Anglo-Sax. Evang.' p. 520.

Mr. Ray to Dr. Hans Sloane.

Black Notley, July 27, 1703.

Sir,—It is now a good while since that I acquainted you that some friends advised me, in order to the compiling a History of Insects, to describe such exotic species as were to be found in the cabinets of the curious in and about London or elsewhere, if I could procure the sight and use of them; whereupon you very freely and generously offered me the use of your collection, which far transcends

all the rest, and wherein there are not many species wanting that are in other men's hands, especially of such as are for their rarity or beauty most valuable. Your kind offer I was not then very forward to accept, because I thought it very difficult, if possible, to send and remit them without prejudice. But since I have been so ill and indisposed with frequent diarrhœas and the pain of my sores, that I have had little will or ability to mind anything else, and therefore begin to think I must lay aside all thoughts of such a history.

But because I do not remember that I gave you a full account of my design, I shall do it now. I did not intend to write an universal History of Insects, but only of such British ones as have or should come to my knowledge, which I do believe would scarce amount to a third part of such as are natives of these islands; and such exotics only as are to be found in the hands of the virtuosi about London, especially yourself. But these separately; first, the British by themselves in each tribe, and then the exotics after them by themselves. I intended to begin with the Papilionaceous tribe, not because they are the first in order of nature, but because I have taken most pains in searching them out, and have described most species of them. Of these, the diurnal ones are not very numerous, I having not observed above forty-five sorts of them. But of the nocturnal, should I live twenty years longer, I despair of ever coming to an end, every year offering new ones; and yet I have already observed about 300 species, and this within a small compass of ground. But these I shall so methodise that it shall not be difficult for any man to find any Phalæna he shall discover in the method, if it be there described, or else to know that it is a new one, and not described by me; but enough of this, it not being like to take effect.

Now, sir, let me ask (for I hear you have had him under cure) what you think of Sir Thomas Willughby, whether he be likely to recover a perfect state of health again. I cannot but be much troubled and concerned

for him. I wrote to him about his father's 'History of Insects,' but received no answer from him. I shall give you no further trouble at present; but with humble thanks for the many favours and kindnesses you have formerly shown me, and the tender of the services of my wife and girls, conclude this prolix letter, resting,

Sir,

Your most humble servant and orator,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to [Mr. PETIVER ?].

SIR,—I wrote to you a while since concerning those additions which you were pleased to give me hopes you would make to my Supplement. Hist. Plant., which I hope came to your hands, and that you are not unmindful of the request I made to you therein, which I now renew; I have also something else to communicate to you, and desire your assistance in. Some friends would put a new task upon me, that is, of drawing up a History of Insects, which I have some thoughts of doing, though, indeed, I am in ill case to attempt such a thing, labouring under almost constant pain, which renders me unfit for business, being not able to mind anything with attention. If I do undertake it I must desire the use of your exotic insects to describe, and get figured, as also a sight of your English Papilios, both diurnal and nocturnal, or Phalænæ. I have seen and described the most part of the English diurnal ones, but I hear you have some new ones out of the west. The Phalænæ are innumerable, and doubtless you have met with abundance not discovered by me.

Most of the exotic insects that are come over into England are in your and Dr. Sloane's hands. Dr. Sloane hath very frankly and generously promised me the use of

his, and I hope you will not deny the like of yours. My design is, first to describe and figure our British insects by themselves, tribe by tribe; and then to each tribe to add the exotics. I shall not pretend to write a perfect history; for though I have described above 200 Phalænæ of our own land, yet I doubt whether I have described a third part of the natives thereof. The exotics are ten times more numerous; but there are but few of them in comparison come over to us, with which I shall content myself. I shall begin with the Papilionaceous tribe, not because I intend that for the first, but because I have taken most pains in it. I shall give you no further trouble at present, resting,

Sir,

Yours in all offices of love and service,

JOHN RAY.

Black Notley, Aug. 25, 1703.

Mr. RAY to [Mr. PETIVER?].

SIR,—You may justly wonder that having so lately written to you I should now give you the trouble of another letter. But I hope you will be satisfied of the reason of my present writing when you shall have read the following lines.

I have lately received a letter from Mr. Smith, wherein he tells me that Mr. Motte saith, he fears that he shall stay for the Appendix to the Third Volume of Plants, and that it will not be ready so soon as he shall have printed off all the rest. This will be very unhappy indeed if it should prove so, for the work hath been already retarded too long, &c. It concerns us, as well for our credit as interest, to get it out as soon as possible, so far he. Wherefore I do now again press you with all earnestness to expedite and get ready your additions as soon as may be. I esteem them so very considerable that the work must not want them, though the edition should be

retarded in expectation, which I hope you will take effectual care that it be not. As for the 'History of Insects,' I am advised by some friends not to engage myself in it. And, indeed the sad pains and infirmities I labour under, threatening the approach of death, incline me to listen to their counsel, though I am not yet resolved what to do. No more at present, but that I am,

Sir,

Your faithful friend and servant,

JOHN RAY.

Black Notley, Sept. 1, 1703.

Mr. RAY to [Mr. PETIVER?].

SIR,—I received yours of Sept. 9th, and am very glad to understand thereby that you are in so hopeful a way of a perfect recovery from so long-continued an indisposition. I give you thanks also for your readiness to communicate your exotic insects to be by me described for my intended history of those animalcules, with what you know of them. But truly they are so numerous, and I so crazy and infirm, that I am not resolved whether to attempt such a work or not. But yet to cut short and facilitate it, I intend not to insert more exotics than are to be found in the cabinets of the curious in England, and which I myself shall see and describe, the most of which (as I before told you) are in your and Dr. Sloane's hands, so that I shall not concern myself with those published and to be published by the Lady Marian, as neither with those of Goedartius, Hoefnagell, Hollar, Aldrovand, any further than to take out of them synonyma of our British ones, and such exotics as shall be seen to [be] described by me.

I cannot but wonder you should have such a great number of diurnal exotic Papilios; by diurnal ones I understand with you such as have *antennæ clavatæ*.

And for the English ones you have been more industrious and happy than I in discovering fifty-five species; whereas all that I could find or procure amount to no more than forty-three; and yet I think I have all mentioned in your 'Centuries.' Of Phalænæ, or nocturnal ones, I have described above two hundred kinds, found near us, and yet am not near come to an end of those of our neighbourhood. I guess those to be found in all England are treble of that sum. But I shall say no more of this subject at present, because I shall not meddle with it till my Supplement be despatched; only, which I had almost forgot, I must acquaint you with what method I intend to use, and that is Swammerdam's, in his general 'History of Insects,' which seems to me the best of all. It would be long to describe it, and therefore I refer you to the book. Be pleased to respite the sending your insects till I be at leisure to describe them, which will not be till my Supplement be out.

Your contributions to my Supplement I wish you would fit for the press yourself, to save me any pains about them; for, alas, I am so ill and afflicted with pain that I am fit for nothing; and yet were I never so well, to examine all particulars would be impossible for me, because I want books, and it would take up more time than the undertaker's interest will admit. My parts and memory are much impaired by age and continual pain. Yet should I be glad to see the plants themselves, which you may please to send down as you intended next week. If figures cannot be procured, it were better lay aside all thoughts of writing a history. I shall at present add no more than that I am,

Sir,

Yours to serve you,

JOHN RAY.

Black Notley, Sept. 11, 1703.

Mr. Ray to Dr. Hans Sloane.

Black Notley, November 17, 1703.

Sir,—I received yours of the 13th November by post, and the next day your rich and noble present of sugar by carrier, for which myself and relatives here return you our very humble service and thanks, which is all the amends we are either at present able, or for the future likely to make you; yet am I willing and desirous to testify my gratitude by some real effect of it, if at any time it shall lie in my power. I shall be very glad to see your China, Indian, and Badminton plants, believing them to be a rare spectacle; but, alas, I am not conversant enough with exotic plants as to be able to rectify any mistakes about them. I fear they come too late to be inserted in my Supplement. I am so constantly afflicted with pain, that I am able to do little, and can proceed but very slowly in any business I undertake. I have not laid aside all thoughts of the History of Insects, but wait till this Supplement be off hand before I set upon it. Dr. Robinson would have me first to compose and publish a Method of Insects, which I think might be of use, especially if I should happen to die before the History be finished. My booksellers have imposed a new task upon me, that is, to make such alterations and amendments as are necessary or convenient in, and additions to, my three Physico-theological discourses, which they are now about to print the third time. This being all I have to communicate at present, I take leave, and rest,

Sir,

Yours in all service,

John Ray.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, November 24, 1703.

Sir,—The box of plants, which you did me the favour to send me last week, came safe, for which I return you thanks. I have cursorily overlooked them, and do find that the specimens from Badminton are very fair ones, and curiously dried and preserved. The Chinese and Indian ones want much of that perfection and elegancy the others have.

As leisure and freedom from pain will permit, I intend to survey all more diligently, and give you such a poor account as I can of them. I have not been conversant enough among Indian and American plants to be able to judge aright of them. Dried specimens cannot represent all the principal parts, flower, seed-vessel or fruit, and seed; and I have seen none of late discovery growing in gardens, not having ability to take journeys to visit them.

I long till this Supplement be off hand. I am sensible that I am no longer able to do anything laudable in botanics, memory and parts failing me, being much weakened by age and diseases; but enough of complaints. I take leave, and rest,

Sir,

Your very humble and much obliged
servant and orator,

John Ray.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Mr. Mott.

B. N., December 1, 1703.

Sir,—I received yours of the 27th, imparting the sad news of the dismal effects of the late tempestuous wind at the City of London. We in the country hereabouts have not fared much better as to our damages, but I have not heard as yet of any person that hath been killed. For mine own part, I have not escaped altogether scot free, but have sustained considerable loss in the tiling and covering of my house and barns, and by the blowing down two trees, a large oak and an apple-tree.

In the little roll of copy I sent you there were three parcels, the last of which wanted a title, which I have now subjoined to this letter, and desire you would prefix it to that parcel.

I sent a paper containing several observations to be added to my Supplement to Dr. Sherard, who told me he had delivered them to Mr. Mott, who promised to insert them in their proper places; but I do not find them in the copy. They cost me some pains, and I should be sorry they should be lost. Better be thrust into the Appendix than quite omitted.

My wife and girls salute yourself and brother partner with the tender of their respects by the hand of,

Sir,

Yours to serve you,

John Ray.

For Mr. Mott.

Mr. Ray to [Mr. Petiver?].

Sir,—I received yours without date on Sunday last by post, and the evening before a parcel inclosing some letters, and the book you mention, which I read over, and found some very good observations and experiments concerning the male seed and generation of plants. You being in haste to have it returned, I shall send it next week if the carrier go, and may then send my papers to Mr. Mott, with punctual directions where to insert the particulars. You do very well to continue correspondence with Father Camelli, who is a very industrious and ingenious person; but I am sore afraid that the wars will interrupt your epistolary commerce. He deserves to be by all means obliged, being made, as I may say, for the advancing of natural knowledge.

The dried plants you were pleased to send me I had before now finished the perusal of and sent back, had not the weather fell out so sharp, and my pains so great as in a great measure to disable me; however, God willing, you shall have them within three weeks at furthest, and then I desire you would send your Chusan plants, for I would fain compare them with those Dr. Sloane sent me, which are without names. The rest of the plants you signify your intention to send me, though I should be glad to see, yet because they will come too late for me to take any notes of to use in this work, you may please to respite the sending of at present; only I desire you would draw up such an index as you mention of them, that the book may not quite want them. There are some other particulars which I should have returned answer to, but I want time at present, the messenger being in haste. I thank you for your kind expressions of affection, and am, reciprocally,

Sir,

Yours in all offices of love and service,

John Ray.

Black Notley, Dec. 22, 1703.

Mr. Ray to [Mr. Petiver?].

Sir,—I received your affectionate and obliging letter, and return you many thanks for your good opinion of my doings, and so much the more by how much I am sensible it is less deserved. Though I dare not suspect for insincere anything I find therein, but do look upon all as the real language of your mind, and true expression of your present sense, yet I should very much contradict my own knowledge should I accept as due the high character you are pleased to bestow upon my mean performances, or value myself thereby. *Tecum habita et noris quam sit tibi curta supellex*, was a good advice of the poet. I may truly say, that if, secluding affection, you would, after just examination, weigh my 'History of Plants' in the incorrupt balance of impartial judgment, you would find it rather to need pardon than to merit praise, so many defects and errors there might be discovered therein. Though I was to blame for undertaking such a task, being conscious of my own inability to perform it, yet more culpable for not rendering it so correct and perfect as I was capable, by huddling it up in haste, and not bestowing time and pains enough upon it; in excuse whereof I have no more to plead than I have already alleged in the preface.

As for what I have said concerning yourself, I am sure that could not bribe you so far to exceed in my commendations, it being no more than you might justly challenge. You may, without the least imputation of pride or self-flattery, think as well of your own abilities as the usual acception of these epithets amounts to; and this all that know you so well as I do must needs acknowledge is no more than the truth will warrant. I hope ere long you will verify what I have written of you, and oblige the ingenious by making public, with the addition of your learned illustrations, that rich treasure, or botanic

store, which you have with so much pains and cost amassed. You may with more alacrity and satisfaction prosecute such an undertaking, or might indeed have composed a history of plants, whose profession leads you thereto, than I, without the verge of whose calling it lies, and who can scarce find arguments sufficient to satisfy myself, and justify my proceedings. Your, and other of my friends' opinions and arguments do so much weigh and prevail with me, as to induce me to think more favorably of what I have done, and not altogether condemn my studies. I could do no less than return these few lines in answer to your elaborate letter, to which I shall only add that I am,

Sir,

Your very humble servant,

JOHN RAY.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, March 5, 1704.

SIR,—Yours of April 1st I received, whereby I understood that the box of plants found not its way to you, at which I was not a little troubled; whereupon I sent to the carrier's to inquire after it. They told the messenger the box was not at Braintree, but was sent up to London Wednesday before. The carrier laid the fault on his porter, but promised, at his next going up, to take care of it himself, as I hope he will, else he must be accountable for it. I must now, to do Sir Thomas Millington right, acknowledge a mistake of mine in the description of his antiscorbutic receipt, for he did not say that all the ingredients were to be boiled in the wort, but the dock

roots only. The herbs were to be put in a bag, and hung up in the vessel after the drink was wrought. I have not begun this method yet, the weather falling out so very sharp.

My wife and girls give you their most humble services.

I am, Sir,

Yours entirely,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, May 7, 1704.

SIR,—Since you were so kind as to desire to know the success of the method of physic I have lately entered upon, I ought to have given you satisfaction before now, and you may justly think me very much to blame that I have not; but when I shall have acquainted you with my condition during this time, I hope you will excuse me. At first I began with a tincture of steel in wine, and the diet-drink prescribed me by Sir Tho. Millington; after which, within a few days, I took a dose of rhubarb, which, though sufficient for any ordinary man, yet wrought not upon me till the afternoon, nor then to any purpose, but the day after I took it, sufficiently. After a few days more I took another dose of rhubarb, quickened with some grains of scammony, which wrought with me not only the day I took it, but four or five days after, yet moderately and without disturbance. This interrupted

me in the use of the chalybeate medicine, yet I stuck to my diet-drink; but observing lately that I was still in a purging condition, so that I was forced several times to rise in the night, and that this purging happened those nights I had taken a draught of my diet-drink at or after supper, I began to suspect, and am now fully persuaded, that this diet-drink is purgative by reason of the dock roots, those that prepared it boiling too many in the wort; so now I am returned to my chalybeate drink, and have moderated the use of my D. D. Notwithstanding the interrupted and irregular use of this method, my smaller sores on my legs and feet are most of them healed and dried, and I have cleared my legs of a great part of the scabs and scurf wherewith they were almost covered; but yet the pain continues still, and I am as unable to walk as before. Pardon this tedious περιανζυλγοία, which yet I should not have troubled you with but in obedience to your command. I am,

Sir,
Yours in all service,
JOHN RAY.

My wife and girls give you their very humble services.

For his honoured friend, Dr. Hans Sloane, at his house at the corner of Southampton street, towards Bloomsbury square, London.

Mr. RAY to [Mr. PETIVER?].

SIR,—The pains I do almost constantly labour under make it somewhat uneasy to me to write, else I had not deferred thus long to return you many thanks for the great pains you have taken to enrich my history with such a multitude of rare and nondescript plants from China, India, Africa, and America, as the many friends

and correspondents you have in all parts have furnished you withal.

I cannot but wonder that my booksellers should be so slow and dilatory in publishing this book, the edition whereof one would think it should be their interest to hasten. I have received no sheets of the Appendix since Father Camelli's history.

I am now about drawing up a Method of Insects, in order whereto the 'General History' of Swammerdam, in Latin, would be very useful to me, and save me much pains and time in translating out of the French edition (which only I have) into Latin what I shall borrow out of it. I have written to Mr. Smith more than once to procure me one, but he hath either forgotten or neglected it, so that now I must entreat the loan of yours for a while. I shall carefully return it again so soon as I have done with it.

Some of your English insects I have not seen, others I am in doubt of. Mr. Dale will send you an account of them. Such as I have not I desire you would send me to describe; and so doing you will further oblige him who is already,

Sir,
Very much yours,

JOHN RAY.

Black Notley, May 17, 1704.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, June 8, 1704.

SIR,—Since my last to you, all my hopes of amendment and relief by the method of physic I use are

quashed. After the sores seemed to be in a fair way of healing, and my legs in a good measure cleared of the scabs and scurf that covered them; I know not upon what occasion, they broke out again, with more and larger ulcers than before, which also ran at a great rate, and continue still so to do, notwithstanding all my physic, so that I do almost despair of any help or remedy. All that I have to do is to endeavour to render them as easy and peaceable as I can. However, I will go on still with my method for some time, till I find by experience that I shall reap little benefit by it. I have drawn up a little method of insects which may take up two sheets. It is very lame and imperfect, especially in the tribe of muscæ. I did intend to have sent it up this day, but I fear it is now too late and the carrier gone. I hear the third volume of my 'History of Plants' is now finished at the press. The 'General History of Insects' I fear I shall be in no case to undertake and carry on, should I live long enough (which I have no reason to hope), my pains are so grievous, and render my life so uneasy and uncomfortable. My wife and daughters send you their humble services and thanks for the noble presents you have made us. Having nothing further to communicate, I take leave, and rest,

Sir,

Your very much obliged and affectionate
friend and humble servant,

Jo. Ray.

To his honoured friend, Dr. Hans Sloane,
at his house, at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, June 10, 1704.

SIR,—I received yours of June 8th, and return you thanks for your good advice therein contained. In most particulars I agree with you, as that this winter weather, unseasonable at this time of the year, hath and doth much exasperate the pain of my sores. Also I am [in] accord with you in what you write concerning too much purging in this or any course. But I have a body on which no cathartics which I have hitherto used will work orderly and seasonably, unless the dose be immoderate. I have not been so careful in keeping up my legs and not letting them hang down too much as you rationally advise, and which I was sensible would be best for me for the reasons you allege. Strait-stockings and bandage I have used and do still, but carelessly and to no great effect. The smalls of my legs I cannot bind straight, because they are almost surrounded with ulcers.

Your advice about the antiscorbutic juices of scurvy-grass, watercresses, and brooklime, I doubt whether it would be agreeable to me, those juices being, I suspect, too hot for me. Sir Thomas Millington cautioned me against the use of scurvy-grass in my diet drink in summer time, upon that account. I find you have a better opinion of my performances in natural history than they deserve. I have ordered my bookseller to present you with a copy of my Supplement of the larger paper, which I entreat you to accept as a small acknowledgment of your extraordinary kindness and the many obligations you have laid upon me.

As for your observations by way of introduction to your 'Natural History of Jamaica,' I should be glad to see them, for my own improvement, not that my appro-

bation is anything valuable. However, I should do nothing more willingly than to serve and gratify you in whatever lies in my power. I and mine are,

Sir,

Your very much obliged and most humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to [Mr. PETIVER?].

SIR,—I received the parcel you sent by carrier, and soon after your letter by post, for which I return you many thanks. You have herein approved yourself to be a person of great candour, and a public spirit, so freely communicating whatever you have of rare and curious to the promoting of any useful design or undertaking, as I am in hopes this I am now entering upon may be, only I fear that I shall never live to finish it; indeed at present I am in no good case to begin it.

My design is in every tribe to put all our English insects that I can discover or procure that belong to that tribe in the first place by themselves; then to subjoin all such exotics belonging to that tribe which I can get a sight or certain knowledge of; the most part of which lie in yours, Dr. Sloane's, and Mr. Stonestreet's hands. Whether I shall take in all described by Aldrovand, Mouffet, and others, I am in some doubt, and incline to the negative. This history of diurnal papilios I do not intend now to proceed any further in. I published it (if it be published) only as a specimen of the work. I have no catalogue or methodical disposition of the several tribes of insects already drawn up, nor do I intend to draw up any of any tribe till I come in order to that tribe from the beginning of the work, which will be the

αμεζαμόρφωζά ἄκοδά, when I shall come to those numerous tribes of scarabæi, phalænæ, and muscæ, then a little of your company will be very acceptable, and expedite and clear all things very much, and save a great deal of writing and sending to and fro, as you say well.

The present of my Supplement is rather the payment of a debt than a gift, and therefore there is no thanks due for it.

Mr. Dale and myself have diligently compared the specimens you sent of our English papilios, and the explications of them in the Catalogue, with ours, and find that you have several species we want, especially of the blue ones, and we but one or two which you want. I have desired Mr. Dale to give you an account of all, as also of some mentioned in your Catalogue which you have sent no samples of, &c., because much writing is grievous to me in the condition I am in at present, and besides, I have several letters to write. I have written to Mr. Smith to desire him to deliver to you two copies of my Supplement for Father Camelli and Mr. Bulkley, which I hope he will do. Your specimens of the more rare officinal plants are a very curious and lovely spectacle, and divers of them, nay, the most of them such as I had never seen. They shall be carefully remitted to you. This being all that I can think of at present, I rest,

. . . . . offices of love,

Black Notley, June 19, 1704.

Mr. Ray to Dr. Hans Sloane.

Black Notley, August 9, 1704.

Sir,—These are to acquaint you that I have now begun the 'History of Insects,' which, because it would be but a blind and useless work without cuts, I intend, with your approbation, to publish such a proposition as this.

Having by me a competent quantity of materials for a

History of Insects, collected partly by myself, partly by Francis Willughby, Esq., deceased, expecting also great contributions from my friends skillful in that part of natural history, I intend, God producing my life and granting me a tolerable measure of ease, to draw up such an history, and have already begun and made some progress in it; which, because it will not be of half the use if published without figures as it would be if illustrated therewith, and because the graving of them is a matter of greater charge than I can sustain, I am constrained to beg the assistance of ingenious gentlemen and wellwillers to this kind of learning in contributing toward the charge of the plates the moderate sum of ten shillings, which shall be well husbanded and faithfully expended on the gravers and supervisors of the work. If the sum collected doth not suffice for plates for the whole work, then I must pray a further supply from the contributors, to whom what is finished and wrought off shall be delivered, who thereupon may either cease or contribute further as they shall see cause.

If you mislike this proposition, or if you would have [any] thing added or omitted, altered or amended thereto or therein, be pleased to signify to me what you mislike or disapprove. I shall shortly want a sight of your exotic diurnal papilios, for I intend first to describe and figure that tribe; but I dare scarce desire the sending them down hither, for fear lest they should receive any prejudice by the way bringing down or carrying up. I continue still very uneasy, by reason of the pain I almost constantly labour under. I may possibly find about two hours in a day to bestow on this History. This is all I have to trouble you with at present. My wife and girls salute you, and give you their humble services, and I am,

Sir,

Yours in all offices of love and service,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to [Mr. Petiver?].

Sir,—I had this day sent back your books of figures, but I desired first to have a little conference about them with Mr. Dale, and he was so busy yesterday that he could not come over hither; next week they shall be sent. I fear you may want them. I find that at least half the papilios therein figured are common to us in England.

I have now begun my intended 'History of Insects,' which I shall prosecute as fast as health and ability will permit, but truly I am but seldom so easy as to do much in it. I cannot hope for above two hours in a day to bestow upon it. I intend to publish a proposition for a contribution toward the charge of graving plates for it, a rude draught whereof I have sent up to Dr. Sloane, with whom if you please you may see it.

I have now described all the diurnal papilios hitherto observed in England, except two or three of your oculate ones; which also I shall dispatch so soon as I see Mr. Dale; and then there will want nothing but icons for them, which you are the fittest person to add, as knowing where the best figures of such as are already graven and published are to be found; and for the rest they must be new drawn. I have six of the rarer sorts curiously drawn, and sent me by Dr. Kreig when he was with you at London. I find in Mr. Willughby's collections a diurnal papilio whose eruca is gregarious and feeds upon holly.

I have written to Dr. Sloane to desire the use of his exotic diurnal papilios so long till I have described them, which I shall do with what speed I can. I now make the same request to you. I fear they may receive some prejudice by the carriage up and down, but I know not how to help it. Up to London I cannot go. One thing may be of advantage, that you see what each other send, and so you may avoid the unnecessary sending the same

species twice. This is all necessary to acquaint you with which occurs to my thoughts at present. So I bid you heartily farewell, and rest,

Sir,
Yours to serve you,
JOHN RAY.

Black Notley, August 9, 1704.

Mr. RAY to [Mr. PETIVER?].

SIR,—I should not have troubled you with this letter had it not been to beg your pardon for not being so good as my word in sending back your books. Really, at the time I should have sent them to the carrier's I quite forgot it, my memory being much decayed by age and the sharp and long-continued pains I labour under. Next week I hope I shall remember better.

I know not whether I told you that I have quite finished the descriptions of our English diurnal papilios; there remains nothing now but procuring figures for them. I intend (as I told you) to publish a proposition for contributions for graving of plates. The rude draught I sent to Dr. Sloane is lame, not mentioning in what manner the contributors shall be reimbursed, which I intend to add to this purpose.

If the sum advanced upon such a contribution proves insufficient to defray the charge of plates for the whole work, then upon delivery of so many printed sheets at 1*d.* per sheet, and so many plates wrought off at 3*d.* per plate to each particular contributor as shall reimburse him, I shall pray a further supply of 5*s.* a person for the finishing of the work.

I hope you will not forget to send me your exotic diurnal papilios to describe. They shall be carefully remitted, and I hope without any considerable harm.

Perchance Mr. Stonestreet may have some exotic papilios which both Dr. Sloane and yourself want.

I am, Sir,
Yours to serve you,
JOHN RAY.

Black Notley, August 10, 1704.

Mr. RAY to Dr. HANS SLOANE.

SIR,—It is now high time that I give you thanks for the kind visit you made me here, and those rare insects you were pleased to communicate.

I am now entering upon an history of insects, for which you would have been a far fitter person, having, what I want, your senses entire, your strength firm, your understanding and memory perfect. The main reason which induces me to undertake it is, because I have Mr. Willughby's History and Papers in my hands, who had spent a great deal of time, and bestowed much pains, upon this subject, when there were few that minded, or were diligent and curious in it, though now there be many, and it is pity his pains should be lost.

I know not whether I told you that I designed, in every tribe, first to put our English species by themselves, and then the exotic by themselves. I desire you to afford me your help in carrying on this history, and enrich it with some of your observations, especially about flies, wherein we are most deficient.

I hear you have published, in the 'Philosophical Transactions,' a full account, or history, of your new death-watch, but have not yet seen it. I am,

Sir,
Yours in all offices of love and service,
JOHN RAY.

Black Notley, August 16, 1704.

Mr. Ray to Dr. Hans Sloane.

Sir,—I received yours of Aug. 19, and return you many thanks for the pains you have taken in my affair, and the good advice you have given me. Upon second thoughts and further consideration, I think it not so convenient to deliver sheets printed and plates to the contributors so soon as the sum contributed shall be expended, but rather, as you suggest, to deliver to them entire books when the work shall be finished, they paying the surplusage at the rates propounded. My proposition, therefore, (which I submit to your judgment) shall be as followeth:

Having already published the Histories of Birds and Fishes, and a Synopsis of Quadrupeds, there remains only that of Insects to complete the History of Animals; for the furnishing of which, having by me a competent quantity of materials, collected partly by myself, and partly by Francis Willughby, Esq., deceased, and expecting large communications from my friends skillful in this piece of natural knowledge, I am resolved (God producing my life, and granting a tolerable measure of health and remission of pain) to draw up a History of Insects, and have already begun and made some progress in it. But because such a work published without figures would not be half so useful as if illustrated therewith, I intend to get figures engraven for so many species contained therein as I can. The charge whereof being great, I must needs make some proposals for contributions for the carrying it on.

For my own part I shall endeavour—1. That all the figures be exactly like the species described. 2. That they be curiously and elegantly engraven. 3. That they be printed on very good paper. For the effecting whereof the contributors are to lay down ten shillings a-piece, to be put into the hands of Mr. Samuel Smith and

Mr. Benj. Walford, booksellers, at the Prince's Arms in St. Paul's Churchyard, and in each university paid in to such a person as the said booksellers shall appoint to receive it. Each printed sheet shall be afforded at a penny and each plate at —.

When the work shall be finished, every contributor shall have a book delivered him, he making up what shall be wanting of a penny per sheet, and per plate. If any shall please to contribute more than ten shillings, he shall receive proportionably in printed sheets and plates at the rates aforesaid.

I am sorely afraid that your insects may receive some prejudice in sending and returning, let all imaginable care and caution be used in securing them; though I once received a large box of insects from Mr. Tilleman Bobart, from Oxford, without being harmed at all. I thank you for your good opinion of me, and wish this work may answer your expectation. I shall push forward with all the haste my crazy condition will permit, considering that my life is uncertain and may likely determine before the work be finished.

I do not well like the cuts of Mr. Petiver's Gazophylacium; they are not so elegant and polite as I could wish mine might be. I am,

Sir,

Your highly obliged and most humble servant,

JOHN RAY.

I had almost forgot to tell you that I should be very glad to see your Mouffet, and that it may be of great use to me.

I mention receivers to be appointed in each university, because I conceive that if the money be to be sent up to London by each contributor, I shall not have half the number of contributors as if it were to be paid at the universities. The like might be done [in] other great cities, &c.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Mr. Derham.

Sir,—Yours of August 28th came to hand, for which I return thanks. I am sorry you cannot as yet perfect your 'History of Gnats,' of which I admire you should discover so many distinct species, indeed that there should be so many *in rerum naturâ.*

As for the cimices they may easily be compassed; but to find out, describe, and methodise all the species of flies and beetles of England alone, is the work of a man's life.

The phalænæ are so numerous, that should I live twenty years longer, and were in condition to search them out, yet I should despair of coming to an end of them, much less of discovering the several changes they go through, from the egg to the papilio, and describing the erucæ and aureliæ of each.

I am of opinion that the number of beetles is equal to if it doth not exceed that of papilios, and they all undergo the like changes with them, of which I know no man hath given us any tolerable account.

The name of *Musca* I know not how far to extend, but if we make it to comprehend all the Dipteræ, then it will take in gnats and tipulæ; and if them only, where shall we place the *Muscæ papilioniformes* and *formiciformes*, &c.

I should refer all flying insects with four membranaceous wings and a sting in their tails, to the bee-kind; but then I must draw under that tribe the formicæ, which have bodies too unlike.

The work which I have now entered upon is, indeed, too great a task for me; I am very crazy and infirm, and God knows whether I shall over-live this winter. Cold weather is very grievous to me; besides, I have not bestowed sufficient time and pains in the quest of any tribe of insects except papilios, and I have told how far

short I am of perfection in that. I rely chiefly on Mr. Willughby's discoveries and the contributions of friends, Mr. Petiver, Mr. Dandridge, Dr. Sloane, Mr. Morton, Mr. Stonestreet. As for my own papers on this subject, they are not worth the preserving; and Mr. Willughby's must be returned to his son, Sir Tho. Willughby, from whom I had them, with promise to return them if I did not make use of them.

Black Notley, Sept. 6, 1704.

Mr. RAY to Dr. HANS SLOANE.

Black Notley, Oct. 4, 1704.

SIR,—I received yours of Sept. 30th, and am of your opinion, that the booksellers will not go cordially about the work. There is not that prospect of gain, which alone moves the wheels with them. As for any engagement of mine to give Mr. Smith the copy, I remember no such thing. Let him produce any letter of mine containing such promise, and it will suffice. I proposed to him whether he would be concerned in the work or no; and after I told him what endeavours I would use to procure subscriptions, he consented. Now of a long time I cannot extort a letter from him, though I have written to him about several particulars. I suppose the sale of my third volume of 'Hist. Plant.' doth not answer expectation; and that he thinks my demand for the copy too great, though it be no more than Mr. Faitherne gave me, and he himself first put me upon it. My demand is thirty pounds in money, and twenty copies to present my friends.

Dr. Robinson and Mr. Petiver have business enough of their own, and cannot spare time to bestow upon another man's work.

I am in a sad infirm condition, and my sores run worse than ever, and (which is worse) my toes are ulcerated and run at a great rate, so that I have little heart to proceed in this work, and have had thoughts to finish the work so far as I can before I make proposals for contributions. But then the graving of plates would be so tedious a work that it deters any from contributing.

I humbly thank you for your great kindness to me, and the offer of the use of your insects, but am not yet ready for them. This cold weather hath given me a great shock. My wife and daughters present you with their humble services by the hand of

Sir,

Your devoted servitor,

J. RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

B. N., November 1, 1704.

SIR,—I should have written to you in answer to your last of Oct. 10, to give you thanks for your many favours, but truly I have been ever since so afflicted with pain, that I have no heart to do anything. I do very much approve all your advices, but yet cannot take them. The 'History of Insects' must rest, if I continue thus ill, and I see no likelihood of amendment unless I should overlive this winter, which I have little reason to hope or expect. However, though I fail, there are many at present more able and skillful in this part of the history of animals than myself; as first of all yourself, next Mr. Stonestreet, then Mr. Petiver, Mr. Derham, Mr. Morton, Mr. Antrobus,

Mr. Dandridge, Mr. Bobart, and many more. Pardon my scribbling, who am scarce able to manage a pen.

I am, Sir,
Most highly obliged and obedient
friend and servant,
J. Ray.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Black Notley, December 12, 1704.

Sir,—Monday last I received by carrier your noble present of sugar, for which I return you a thousand thanks, as do also my wife and daughters, who say you are [a] brave man.

I thank you for all your advices, I cannot but highly approve of that of keeping up my legs. But my knees being almost constantly kept bent by my sitting, the nerves and muscles are so contracted that I cannot stretch them out without pain, much less keep them so. I will endeavour what I can.

The other I shall also carefully observe so soon as I can get the things, and do hope and believe they may be useful and helpful to me. Your judgment I much value.

I continue still full of pain, and my sores rather spread than contract, which quite spoil my memory, and weakens my other parts, and therefore I hope you will pardon the many errors in this short letter, resting,

Sir,
Your extremely obliged and most humble
servant and orator,
John Ray.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

DEWLANDS.

Mr. RAY's last letter to Dr. HANS SLOANE.*

B. N., Jan. 7, 1704.

DEAR SIR, THE BEST OF FRIENDS,—These are to take a final leave of you as to this world. I look upon myself as a dying man. God requite your kindness expressed anyways towards me an hundredfold, bless you with a confluence of all good things in this world, and eternal life and happiness hereafter, and grant us a happy meeting in Heaven,

I am, Sir,

Eternally yours,

JOHN RAY.

When you happen to write to my singular friend Dr. Hotton, I pray tell him I received his most obliging and affectionate letter, for which I return thanks, and acquaint that I was not able to answer it.

For Dr. Hans Sloane, at his house
in Southampton square, London.

Mr. DALE to Dr. HANS SLOANE.

Braintree, Jan. 19, 1704.

SIR,—By last Sunday's post Mr. Ray's solemn farewell was sent you, since which, viz. on Wednesday, the 17th instant, about 10 in the forenoon, death cut the fatal thread of life, and deprived the commonwealth of learning, of so valuable and worthy a man; but our loss is without doubt his gain; God grant we may meet him above, where death can no more separate, which is the earnest prayer of

Sir,

Your obliged humble servant,

S. DALE.

For Dr. Hans Sloane,
at his house at the corner of Southampton square,
Bloomsbury, London.

* Mr. Ray died on 8 Jan. 17, 170½, about 10 o'clock in the morning.—*Note on the original letter.*

[*The following Letters of Mr. Ray, without date, are preserved in the Library of Sir Hans Sloane, and as it is difficult to assign any particular period to their authorship, I have inserted them in this place.*]

Mr. Ray to [Mr. Petiver?].

Sir,—I received yours of Feb. 3d, mistaken, I suppose, for March, but am but in bad condition to return answer. I suppose Mr. Smith hath acquainted you how I am at present. Yet since my last to him a sad accident hath befallen me; part of the flesh of one of [my] insteps by degrees blackening is come to putrefy and corrupt. I suppose it is a beginning gangrene.

I very much approve what you advise concerning the addition of F. Plumier's Catalogue of American plants: but I cannot without great difficulty write to Dr. Hotton; and should I write, I fear it would come too late.

The heads of Rumphius's History I heard nothing of from Dr. Sherard, which I much wonder at.

The sending the Chusan plants you may please to respite for the present, for I can do nothing now. I shall add no more, but that I am,

Sir,

Yours to serve you in what I can,

John Ray.

Mr. Ray to [Mr. Petiver?].

Sir,—I received yours of October 23d, and the box of plants you sent by carrier. I have run them over, but not as yet carefully perused them; there are many rare things. I thank you for the sight of them, and shall after awhile carefully return them to you. I shall be very glad to see your Chusan treasure. I give you thanks also for your 10 Centuries, which indeed are very useful to me. For your second Decade I was beholden to you before, and therefore this now sent I desire your order how to dispose of.

I have another alarm from Mr. Smith concerning the Appendix, which Mr. Motte tells him, he thinks he shall stay for the copy of, which will be a great prejudice to them, the work having been long in hand already; they having disbursed a considerable sum for paper long since, and for the printing lately: wherefore I entreat that you would speedily get ready what you are pleased to contribute; and if you think it convenient for me to revise it, I pray send it hither. What I have to insert I intend to send up by next week's carrier; the chief of which is Father Camelli's manuscript, and Monsieur Tournefort's Corollarium put in an alphabetical method, and your sixth book of Mr. S. Brown's in the 'Philosoph. Transact.' Dr. Robinson hath persuaded me to draw up and publish a Method of Insects, with some general notes, which yet I must defer doing till this Supplement. Hist. be off hand.

Those very kind expressions wherewith you conclude your letter, I cannot but gratefully resent, and acknowledge myself obliged to you for, whom I look upon as one of the most skillful and active promoters of natural history, I will not say in England, but in all Europe. Indeed, I know not any which hath a more comprehensive and critical knowledge of all the species of nature. Proceed with courage, and transmit your name to all posterity.

I am, Sir,

Yours in all offices of love and service,

John Ray.

Mr. Ray to Dr. Hans Sloane.

Sir,—These are to acquaint you that the box of papers you sent last week came safe to hand the beginning of this. I cannot but wonder you should find such a multitude of birds in Jamaica, and yet I suspect some might escape your diligence. Among the numerous species of Mexican birds described by Hernandez, possibly there may be some the same with some of your smaller birds; but it would be too great a fatigue to compare them, his being put in no order, so that for every bird one must turn over the whole book, and read the descriptions too of such as are of equal bigness.

I am in some doubt about the *Perdix montana*, which you, not without good reason, refer to the dove-kind, for most of the notes agree to it: only by the figure it seems to be shorter and rounder winged than any pigeon, and therein to resemble the poultry kind. Its breeding upon trees argues it to belong to the pigeon kind, for the young of all the poultry tribe feeding themselves, must needs be hatched on the ground. If it breeds but two young at a time, and feeds them by eructating into their mouths meat mollified in its crop, it is certainly a pigeon, be the wings of what length or figure they will.

Your singing-bird, mock-bird, or nightingale, is the same which Hernandez, and out of him Nieremberg, describe by the name of *cenconthatolli*, and is common to Virginia, described by Mr. Clayton in his letter to the Royal Society, registered Philosoph. Transact. N. 206, p. 993.

Your Noddy, is the *Passer stultus* of Nieremberg, which I suppose he took out of Oviedo, a book I am not acquainted with. (See Willugh. Ornithol., Append.) Your Long-legs seems to me to be the very same with the European *Himantopus* of Gesner and Aldrovand: (Willughby Ornithol. p. 227), all notes agreeing.

But I will trouble you with no more remarks by letters,

what else I have made, or shall further make, I will send you as I did the former upon the fishes, when I remit the papers, which I shall despatch so soon as conven[iently] . . . . . ice, and I am,

Sir,

. . . . . much yours in both capacities,

friend and servant,

JOHN RAY.

Mr. RAY to Dr. HANS SLOANE.

SIR,—I received your letter, with the specimen inclosed, which seems to me to be the *Sesamoides Salämanticum magnum* of Clusius, or *Lychnis viscosa flore muscoso* of C. D. [*Silene Otites*, Sm.], which I have observed to grow plentifully upon Newmarket Heath,—that part I mean that is in Suffolk, for on Cambridgeshire side I have not found it. I can but wonder it should have such a virtue as you mention, but it seems it is well attested. Dr. Hulse writes me he finds it in *Grayes Farrier*.

If you go to Jamaica, I pray you a safe and prosperous voyage. We expect great things from you, no less than the resolving all our doubts about the names we meet with of plants in that part of America, as the Dildoe, Mammæ, Mangrove, Manchinello, *Avellanæ purpatrices*, the Sowersop, and Custard-apple, of most of which though I am pretty well informed, and satisfied by Dr. Robinson, yet I shall be glad to be either confirmed, or better informed by so knowing and curious an observer as yourself. I should be glad to know what manner of fruit the Mandioca bears, for (whatever some have written) that it is not without, I am confident. You may also please to observe whether there be any species of plants common to America and Europe, and whether Ambergrise be the juice of any

sort of metl or aloe dropped into the sea, as Trapham would have it. What kind of Arundo it is the same author calls the Dumb-cane, as also what his animal seeds may be. The shining barks of trees he mentions deserve observation, because I find nothing of them in other writers. I shall not instance in more particulars. I wish your voyage had so long prevented the publication of my History that I might have been satisfied and informed by you of these and a thousand other particulars, and had so great an accession of new and nondescript species, as your inquisitions and observations would have enriched it withal. I take leave, and rest,

Sir,

Your very humble servant,

JOHN RAY.

For Dr. Hans Sloane, at Mr. Wilkinson's,
a bookseller at the Black Boy, over against
St. Dunstan's Church, in Fleet street, London.

Mr. RAY to Dr. HANS SLOANE.

SIR,—I have herewithal sent you a short account of your Jamaica Catalogue, which I could not defer to draw up, being requested by so good a friend. What you find deficient therein please to supply; what erroneous to correct; what, upon any account, you mislike, to expunge; or, if you please, to cancel the whole, and draw up a better of your own.

Myself and wife are so far obliged to you already for the rich presents you have made us, that we are ashamed to receive any more; however, we return you our humble thanks for your kind intentions.

As to the *Sorgum*; you remember aright, that it hath a more compressed and compact panicle than the *Milium*, &c., and the branches of it more stiff and erect, so that (as

I have elsewhere noted) they make brushes at Venice of the panicles thereof, when the grains are stripped off.

I am inclinable to believe that Dr. Plukenet is in the right in making the American Couhage and the Nai-Corunna of the East Indies to be distinct plants, as I was suspicious when I wrote my 'History of Plants,' from the different colour of their seeds.

I shall not at present return answer to the other particulars of your letter, being somewhat straightened for time, but with the tender of my wife's humble service, conclude and rest,

Sir,

Your affectionate friend and humble servant,

JOHN RAY.

To his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Preface by Mr. RAY to Dr. HANS SLOANE's Catalogue of Plants.

THE author of this Catalogue doth not present the reader with titles of plants collected out of other men's writings, or of which he had seen only dried specimens, but of such as himself saw growing in their native places, among which there are a great multitude of new and non-descript species; in one genus alone, viz. those called capillaries, no less than three score, besides those lately published by F. Plumier in his first volume of 'Descriptions of American Plants,' which our author had observed and described long before that book came out; and these not small and contemptible ones, or hardly distinguishable from the plants of that kind already described, but of eminent stature and beauty, and some of them of so strange and exotic form, that if delineated they could not but invite and gratefully entertain the spectator's eye;

for, 1st, who would not be delighted to see an arborescent fern, of a single woody stem, straight and undivided, bearing leaves only at the top like a palm-tree; or, 2dly, capillaries of almost all kinds creeping on trees, or rocks, or the ground, with wires after the manner of strawberries; or, 3dly, capillaries, the tip of whose leaves turning downwards, and touching the earth, takes root and puts forth a new plant, so propagating their kind; or, 4thly, capillaries putting forth from the middle stem of their leaves two shoots, each bearing a spike of flowers and seeds? I confess, when I first saw the author's stock of dried plants collected in Jamaica, and some of the Caribee islands, I was much surprised, and even astonished, at the number of the capillary kind, not thinking there had been so many to be found in both the Indies. I might say much of the other generas, but I refer the reader to the book itself.

Secondly. The author in this Catalogue hath done great service to at least the inferior ranks of herbarists, in reducing and cutting short the number of species, which were unnecessarily multiplied. For observing that those who have published Itineraries, or descriptions of the several parts of America, for want of sufficient skill in botanics, and not being versed in describing plants, have given us such lame, imperfect, and obscure descriptions of such as they took notice of, and of the same tree or herb many times under different names, that the compilers of general histories of plants meeting with these descriptions, and having no other knowledge of such plants than what they derive from them, have repeated one and the same species, once, twice, thrice, (nay, some great authors sometimes even nine times) over, for different kinds. Now the number of plants being in nature so vast, it is pity to add to it more than there are in nature, making two or three of one, thereby both deterring and confounding the learner. To clear up these difficulties, and to reduce all to their proper kinds, no man be well qualified but he that hath a comprehensive knowledge of such plants as

grow wild, or are commonly cultivated in gardens here in Europe, and hath seen the nondescript Americans, or such as are here less known, growing in their natural places, and hath read, considered, and compared, what hath been written of them, either by such who have lived some time in those countries, and published descriptions or natural histories of them, or by such as have only made voyages thither, and given us relations and accounts of their travels, and what they observed during their short stay there, all which qualities concur in our author.

Thirdly. This work is of great use to those that are delighted in reading the relation and accounts of navigators and travellers to and in those parts, to inform them concerning the names of American and Indian plants, they shall therein meet with, to what plants they belong, and where they may find exact descriptions or characteristic notes of them. The author having with infinite pains and patience read the most part of the books of voyages and travels extant, referred the plants he met with therein named or described to their proper genera and titles, under which they are ranked, and by which they are denominated and characterised by the most learned and skilful herbarists of the present or immediately precedent age.

Fourthly. The author in this work hath cleared up and resolved many doubts and difficulties, and informed us of what plants are signified by many nam . . . . . quent in the mouths and writings of our own countrymen, of which before we were either ignorant, or in some doubt. For example, he hath informed us that the Dumb-cane so called, which being tasted, inflames the tongue and jaws in that manner, that, for awhile, it takes away the use of speech, is not properly any species of reed or cane, but of arum, or wake-robin; which quality, indeed, agrees very well to the nature of an arum, which is very acrimonious, but not to any sort of cane. That logwood is not (as we conjectured) the *Ligno Brasiliano simile, seu Lignum Sapon, lanis tingendis per commodum* of Caspar Bauhine, but *Lignum Campechianum*, so called from Campeche, a

province of the continent of America, where they fell yearly great store of these trees, and bring them to Jamaica, and our other plantations, to be transported hither for the use of dyers. That the Dildoe-tree is the same with the Cereus or Torch-plant. "Cæterum Dildoe nonnullis Priapum fictitium significat, quo offrænis lasciviæ mulierculæ abuti solent ad nefariæ quoddam libidinis genus seu coitum umbratilem exercendum." I might add to these the Toddy-tree, the Prickly-pear, the Sower-sop, Bonavists, and many others whose significations may be found in this Catalogue.

Besides, we are assured by this work, that there are some plants common, not only to Europe and America, but even to England and Jamaica, notwithstanding the great distance of place, and difference both of longitude and climate. But here it is to be noted, that the greatest part of these common plants are such as grow in the water or watery places; there being, it seems, a greater agreement between the temper of the waters than of the air in these remotely distant countries.

Mr. Ray to Dr. Hans Sloane.

Sir, — I received yours of Feb. 29th, in answer whereto in the first place I must deny any obligation on your part, but own a very great one on mine. Next I shall acquaint you with the reason I made those queries, which was because in the intended Supplement to my History I am resolved to acknowledge and correct all the errors and mistakes that myself, friends, or strangers shall discover therein. Yet would I do nothing rashly, but be fully satisfied before I correct anything, that it is indeed a mistake.

I proceed now to the particular answers you are pleased

to give to my queries: 1. As to the *Phyllitis*, &c., you have fully satisfied me that yours is a distinct species from Mr. Banister's.

2. The *Frumentum indicum minus*, described by "C.B." out of Tabermont. I do still suspect to be a figment. But I myself, when I was in Germany, observed whole fields, some with a lesser kind of maize differing in nothing from the greater but in the lowness of its stature and smallness of all its parts. But whether this lesser sort be or be not a distinct species, you are not concerned to determine, no such growing in Jamaica.

3. I am not yet fully satisfied that Clusius's *igname* is a species distinct from Marcgrave's, because (as I said) they both came from, or at least were denominated of, St. Thome, and besides, the figures of the root in both authors are alike. Probably, as you intimate, Clusius might have of both sorts, and mingle or confound them into one. It concerns me to be more curious in this inquiry because in my History I have made Marcgrave and Clusius's *inhame* to be one and the same, which, if it be a mistake, must be corrected in my Supplement.

4. You have staggered me in the opinion and persuasion I had that the *Xylon herbaceum* and *arboreum* were two distinct species. I find Bellus is of your opinion, and that Veslingius's description of the seed of the tree kind agrees well to that of the herbaceous, as you also have observed it. But then the fruit which J. Bauhine describes, and which I have seen, must be of another kind. What say you to J. Bauhine's note of the tree kind, that its leaves are smooth? and Vesling's, that he observed not in it that pale yellow flower which is noted in the *Xylon herbaceum?* As to the difference of arborescent and herbaceous, I make no great account of that.

5. Concerning the *Pimpinichi* of Manardes, I see I must still remain in suspense.

6. The Jamaica pepper, or allspice, I am persuaded is specifically distinct from Clusius's *amomum*, &c. This

I was suspicious of when I wrote my History, upon comparing the Jamaica pepper with Clusius's description of the fruit of his amomum, wherein he saith it contained but one seed, and takes no notice of the umbilicus or corolla on the top of its fruit, but was fully confirmed in upon the sight of your figure of the Jamaica pepper-bush, and a branch of Clusius's *armomum*, in which the leaves differ too much to be of the same plant.

I shall now, according to your desire, give you those literal errata I have observed in your Catalogue, which are very inconsiderable and not worth the taking notice of, such as you may find thousands of in my books: p. 4, l. 8, *pro* fuciformi *lege* fusi formi; l. 17, *pro* ejectum *lege* ejecta; p. 9, l. 3, *lege* ἄφυλλον; l. 10, τρχόφυλλον and σκίαδι· οκοτυληδὼν δασνακτινοειδὴς. Columna, indeed, writes these words: ἄφυλλον, and τριχόφυλλον, and σκιαδικοτύληδον, referring them, I suppose, to the Greek word βρύον, understood, but they being joined with muscus, I think it is better to put them in the masculine gender; l. 73, *lege* Laricens; p. 20, l. 21, *lege* Maravara; p. 26, l. 12, I was troubled at the word lucum, suspecting it to be mistaken; l. 20, *lege* Castagneda; p. 34, l. 4, *lege* δισαχυόφορον; p. 23, l. 36, *lege* Lonchitidis; p. 34, l. 14, *lege* panicula; item l. 17; item l. 22; item l. 26, 28, 30, 33, 34. But I will go no further, none of these, except the Greek, can be suspected to be mistakes of the author, but only typographical errata, nor can stop or abuse the reader. The truth is, I have not met with a book better corrected. If anything afterwards occurs that needs mending, I shall give you advice of it. My wife gives you her humble service. So I rest,

Sir,

Your very affectionate and obliged friend and servant,

JOHN RAY.

p. 94, l. 28, *pro* Homin. *lege* Hormini; p. 95, l. 22, *pro* polyrhizo *lege* polyrrhizos; p. 129, l. 27, *pro* illinita *lege* illita; *pro* pericutietur, percutictur.

You have done botanics great service in contracting the number of species, and in reducing many exhibited to us by authors under different names to one. I cannot sufficiently commend your pains herein, being so well qualified for such an undertaking.

For Dr. Hans Sloane,
at his house, at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. RAY to Dr. HANS SLOANE.

SIR,—I return you most hearty thanks for your noble present of venison, which seems to be very good. I could wish we might have your good company at the eating of it, only I know it is no novelty to you. I should be glad to see you here as soon and as often as you please, where you shall be exceeding welcome, as you well deserve, to,

Sir,
Your very humble servant,
JOHN RAY.

My wife tenders her humble service to you.

For Dr. Hans Sloane, at Newhall.

Mr. RAY to Dr. HANS SLOANE.

SIR,—I thank you for your last very kind and friendly letter of August 28th, and the advice and directions therein given, which, so soon as I can get the medicine prepared, I intend to follow, unless I find a sudden amendment, which I am not without some hopes of, the ulcers lately seeming to promise healing. I agree with you in opinion, and hope that I may find great help from the use of it. Mr. Dale tells me that it would not be safe for me to dry

the sores without drawing an issue, to give the humour vent, which hath so long been wont to be drained away by them, lest it become the matter of some other disease.

The German which was with me from Dr. Tournefort told me that Schelhammerus (as I remember) had written to Rivinus and me, and that he believed you had a copy of his letter, which, if you have, I beg a sight of it. I lately received a letter from Tentzelius, the author of the Epistle to Magliabechius, published in the 'Philosophical Transactions,' together with some fragments of the teeth and skull of the supposed elephant's skeleton digged up at Tonna, wherein he tells me he had sent the like fragments to the Royal Society, with a letter, desiring their opinion concerning them, but had as yet received no answer from them, so that he suspects his letter miscarried; whereupon he wrote to me urging the same request, viz. that I would send him the opinion of the Royal Society, or, if that cannot be obtained, my own particular, concerning his controversy with the Collegium Medicum Gothanum, which it seems have written against him, and would have these bones to be *Unicornu fossile.* I wonder the Royal Society should vouchsafe him no kind of answer. I have sent Dr. Robinson a copy of Tentzelius's letter, which, if you please, he will give you a sight of.

My wife salutes you with tender of her very humble service by the hand of

Sir,

Your very affectionate and much obliged
friend and servant,
JOHN RAY.

Be pleased to send me word in your next, what is become of Dr. Preston. I have a parcel of plants I received from him which I would willingly remit.

For his honoured friend, Dr. Hans Sloane,
at his house at the corner of Southampton street,
towards Bloomsbury square, London.

Mr. Ray to Dr. Hans Sloane.

Sir,—I received your very kind letter, attended with a noble present of sugar, for which myself and wife, with the tender of our humble services, return you most hearty thanks. Only give me leave to tell you that you have permitted your generosity and kindness too much to influence your liberality, and cause this effect of it far to exceed the merit and expectation of the receivers, and possibility of requital. I have some time since heard of your change of state; and though I have not told you that I wish you much joy, yet really I do, and humbly pray that such a confluence of blessings may attend your marriage as may render that estate comfortable and happy to you.

Your Pinax of Jamaica plants I should be glad to see; not that I hope to correct anything, but for mine own information and satisfaction. My opinion is of little value, my skill being not great in American plants; and the greater part of those you have observed I have no other knowledge of than I received from yourself.

I was in hopes that you would have perfected and published your 'Natural History of Jamaica' before my Supplement might have been ready for the press, that so I might thence have borrowed materials and ornaments for the enriching and beautifying of my work. But I see you proceed with deliberation, and so as may consist with due attendance upon the occasions and business of your profession, which I cannot but commend; though in the meantime others prevent you, and intercept the honour due to you, by publishing before you what you first discovered. I would willingly take leave of this subject of Plants; but, by the importunity of some, and opposition of others, I am constrained to proceed still in it. When this Supplement shall be finished, and something I have further to reply to Monsieur Tournefort, with a fuller explanation and defence of my own method (if God grant me to live so long), I shall have done. The principal

help I shall want will be the sight of the plants in the gardens in and about London. Dr. Robinson, as I remember, once told me that you either had, or could procure, Monsieur Magnol's piece about method, which I was promised by Dr. Sherard, but have not yet seen. If you have it by you, please to lend me it for some short time. I thank you for your good opinion of my doings and endeavours, which yet I must not own or accept as in any measure due, but look upon as another effect of your good will, resting,

Sir,

Your much obliged and affectionate friend and servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
the corner house in Southampton street,
next the Square, Holborn.

Mr. RAY to Dr. HANS SLOANE.

SIR,—I have read over with great pleasure and satisfaction Frederick Martens's Voyage to Spitzberg you were pleased to lend. The author seems to me to have been very diligent in observing, and no less true and faithful in relating and setting down his observations. He hath given me a better prospect and idea of those very northern parts than I had before. I cannot think that there is very much difference in the nature and temper of sea and land, from thence to the Pole itself. Several of the species of birds are the same I have observed to frequent and build on the islets and cliffs on our sea coasts in England and Scotland; only I cannot but wonder that he should meet with so many sorts of Lari there, which want the hind toe; whereas we met with only one here which doth want it, and he too hath some rudiment of it.

I have now a request to make to you, that if you have in your Jamaica voyage, or other travels, observed any new or undescribed species of birds or fishes, you would [be]

pleased to communicate the titles of them, and some short characteristic notes, whereby they may be known, towards the enriching and perfecting my Synopses of those genera which I have now drawn up. I shall do you right in owning from whom I received them, and referring to your future work for a more full account of them; which work, though I long to see published, yet do I with the more patience expect, because I know it will lose nothing by laying in your hands, but will at last come forth, if death prevent not, more elaborate and complete. If death, I say, prevent not, which is possible, the consideration whereof may spur you on to make the more haste with it, knowing the disadvantage posthumous pieces come out with if ever they be published. I have formerly urged to you the expectation of all ingenious persons that know of it, and the danger of being defrauded of some part of the honour justly due to your pains and performance. Indeed, God himself seems to me to have honoured you in having, as it were, made choice of you, and sent you out upon such an errand as observing the rarities and undescribed species of that island, and communicating the history of them to the learned world.

I lately received a letter from Dr. Briggs, wherein he tells me that he had consulted with Dr. Lister and yourself concerning the ulcers on my legs, wherewith I have been troubled now the best part of a twelvemonth, and that you expressed a great concern for my condition; for which kindness I return you hearty thanks. Since my answer to him I found the success of the calomelanos I acquainted him I had taken, better than I did then expect. For after the disturbance and tumult caused by the mercury was appeased, my sores of a sudden grew so well, the pain leaving them, and only a gentle itching succeeding, that I was in great hopes they would have suddenly dried and healed up; but the day following, whether it proceeded from some error in diet, or some other to me unknown cause, the pain returned again, and

they continue still running and unhealed, though better than they were before, so that I am encouraged to repeat again the same medicine. and do hope, through God's blessing a good effect of it. So I take my leave, and rest, Sir,

Your affectionate friend and humble servant,

JOHN RAY.

For his honoured friend, Dr. Hans Sloane,
at Montague House, London.

[*Amongst the MS. of Sir Hans Sloane in the British Museum are the following letters from Mrs. Ray, which, although not strictly coming within the scope of this work, possess an interest on account of their connexion with the history of the family of John Ray.*]

Mrs. RAY to Dr. HANS SLOANE.

Black Notley, ... 1704.

SIR,—My dear deceased husband always esteemed you one of his best and truest friends, and this you manifest to me his mournful widow in your kind letter, for which I return my most humble and hearty thanks; and do entreat the favour of you to use your interest with Sir Thomas Willughby to allow me this half year's salary towards the charges of my husband's sickness and funeral; it is true I cannot demand it, and he hath always been kind to Mr. Ray, which I gratefully acknowledge hath been the support of the family; but being left with three daughters, of which the eldest is about twenty years of age, and the youngest sixteen, and nothing near so much left to main-

tain myself and them with as that legacy was, my circumstances must be but straight. I do intend to dispose of Mr. Ray's books, and will get Mr. Dale to make a catalogue of them, which shall be sent to you, as likewise an account of what papers Mr. Ray left, and doubt not your assistance therein. The papers about insects are delivered to Mr. Dale, to inspect and give you an account of, as likewise the insects, to make a draught of them for to present you with, according to Mr. Ray's order. I intend shortly to write to Sir Thos. Willughby, and acquaint him that his papers are safe, and shall be delivered according to his order; but desire your advice, whether I shall request the half year's salary of him, or leave [my] friends to intercede for me. I can add no more, but that I am,

Sir,

Your most humble but sorrowful servant,

MARGARET RAY.

For Dr. Hans Sloane, at his house
in Southampton square, Bloomsbury, London.

Mrs. RAY to Dr. HANS SLOANE.

SIR,—Yours of the 9th was very accceptable to me, nor can I enough acknowledge the kindness you have therein showed to the poor family of your deceased friend, which had been done sooner, but that yours came not to hand until the 13th, at night. I must confess, sir, that although money is the most needful, considering the scantiness of the maintenance left by Mr. Ray, and the great charge occasioned by his long sickness, yet it is not for me to dictate to Sir Thomas Willughby's generosity, but leave it to his pleasure; entreating you to travel in that affair for me as you shall think fit; requesting you likewise to present my most humble service to

Sir Thomas, and to acquaint him that all his papers are safe, and ready to be delivered to his order, and thereby you will add to the many obligations of,

Sir,

Your most obliged humble servant,

MARGARET RAY.

My daughters present their most humble service to you.

Black Notley, Feb. ye 15th, 170⅞.

Mrs. RAY to Dr. HANS SLOANE.

Black Notley, Nov. ye 19. 1706.

SIR,—Your very kind letter I received last week, for which and all other of your favours and kindness I hereby return you my most hearty thanks, and especially for the great pains and care you have taken upon the account of my dear husband and self. I will, as you desire, return Sir Thomas Willughby thanks for his kindness, and by the first opportunity order where the money he sent me shall be paid; and as to his book and papers about insects, they are herewith sent to you, and hope they will come safe. As to the monument for my husband, I must leave wholly to the directions of my friends, whose kindness and care to preserve his memory I gratefully acknowledge. I having formerly acquainted you with the circumstances of my family, need not repeat it, only let you know it cannot but be straight with us, when Mr. Ray did not leave £40 per year among us all, out of which taxes, repairs, and quit-rents make a great hole. As to my husband's papers, I have put all of them, except some letters, into Mr. Dale's hands, of which I presume he hath given you an account, and will publish what he finds fit. The History of Insects, you know, was left unfinished, and is at your direction; and as to my books, I will send them up as soon as weather will permit, which I fear will

not be now until summer, not doubting in the least of your assistance in their disposal.

Sir, I have no more to add, but the repeating of my thanks and the presenting the services of myself and daughters, subscribe myself,

Sir,

Your most obliged humble servant,

MARGARET RAY.

To Dr. Hans Sloane, at his house in Southampton square, Bloomsbury, London.
With a box.

Mrs. RAY to Dr. HANS SLOANE.

Black Notley, Dec. 24, 1706.

SIR,—I would not have you think me ungrateful in not returning you my most hearty thanks for your last kind letter; as likewise for the pains you have taken for me with Sir Tho. Willughby, but especially for your own very kind intended gift therein mentioned me. The only hindrance hath been because I could not happen of any person in these parts whose stay in London would permit them to wait upon you, considering that your business occasions your being often absent from your house. I entreat the favour of you to leave the money, at your own convenience, with Mr. Saml. Smith and Mr. Ben. Walford, or either of them, to whom I have given advice to receive the money and give you a discharge. As to my husband's letters, I intend very shortly to have them overlooked and send them. I cannot close this without repeating my humble thanks for all your favours, and presenting my daughters' humble services, which likewise accept from,

Sir,

Your most obliged humble servant,

MARGARET RAY.

To Dr. Hans Sloane, at his house in Southampton square, Bloomsbury, London.

Mrs. Ray to Dr. Hans Sloane.

Black Notley, Nov. ye 20, 1709.

Sir,—When your kind and obliging letter came to my hand, I was sick in bed of a fever, which continued upon me for some time; but being now, through the blessing of God, pretty well recovered, I was not willing any longer to omit returning you my most humble thanks for all the kindnesses I have received from you, and especially for the great respect you have now shown to the memory of my dear husband; and I would willingly have done the same to my Lady Child and Madam Howland, but not knowing where to direct to them I entreat the favour of you to present my humble thanks, as likewise to my Lord of London, and the rest of the contributors, though unknown to me. As to the remaining money which you mention, if you please to pay it to the Reverend Mr. Wm. Stonestreet, it will come safe to the hands of,

Sir,
Your most obliged humble servant,
Margaret Ray.

To Dr. Hans Sloane, at his house
in the corner of Southampton street,
towards Bloomsbury square, London.

APPENDIX.

APPENDIX A.

[*For the following Notice of George Scott, of whom no biographical notice could be given in the 'Memorials' (p. 5), the Editor is indebted to Edw. Forster, Esq., Vice-President of the Linnæan Society.*]

GEORGE SCOTT, Esq., F.R.S., the Editor of his uncle Derham's 'Select Remains of the Learned John Ray,' was Lord of the Manor of Woolston Hall, in the parish of Chigwell, in the county of Essex. This manor and seat had been in the family many generations, of which he was the twelfth and last of the name; from him it was inherited by Robert Bodle, Esq., descended from the daughter and only child of his great grandfather's second and youngest son George, Mr. Scott being the grandson of William, the eldest.

This manor was granted, about the beginning of King Henry the Seventh's reign, to William Scott, of Stapleford Tawney, in the same county, who was lineally descended from Sir William Scott, Lord Chief Justice of England, and Justice of the Forests in the reign of King Edward the Third, whose papers and silver drinking-cup were in the possession of George Scott, the subject of this memoir, who was born in Watling street, London, on the 29th December, 1719, and was educated at St. John's College, Oxford, where he took the degree of Master of Arts in 1743, and an honorary degree of Doctor of Common Laws was conferred on him in 1763. He was married on the 13th of May, 1746, in the Chapel Royal, St. James's, to Jane, daughter of Dr. Edmund Gibson, Bishop of Lincoln, and afterwards London, the intimate friend of Ray, who communicated the County Lists of Rare Plants in the Bishop's edition of Camden's Britannia, with the exception of Middlesex, which was furnished by Petiver. George Scott gave some assistance in family history, in a subsequent edition. His aunt Anne, daughter of William Scott, married Dr. William Derham, rector of Upminster, the author of the 'Select Remains.' George Scott died a widower, without children, on the 26th August, 1780, and was buried in the parish church of Chigwell, on the 5th of September in that year. His wife died on the 5th of January, 1770, and was buried on the 21st, in the Bishop's vault at Fulham. There is no monument or inscription for him among those of his ancestors in what is called the Scott chapel in the parish church. The only memorials of him and his wife are their achievements against the walls. It is rather remarkable that, among those of the Scott family, there is an achievement for Bishop Gibson, and another for Dr. William Scott, President of St. John's College, Oxford, son of the rector of Upminster, and therefore Scott's cousin, neither of whom dwelt in Chigwell.

This zealous antiquary resided some time in Sackville street, Piccadilly, which house he disposed of on the death of his wife, which happened in 1770, and also gave up a residence at Bath, and from that time lived entirely at the family seat, Woolston Hall, perhaps rather recluse, as the Rev. Michael Tyson, rector of Lamborn, the adjoining parish to Chigwell, in a familiar

letter to the celebrated antiquary Richard Gough, calls him "the Hermit of Woolston," not meaning certainly that he avoided all company, for Tyson, himself fond of antiquarian pursuits, on becoming incumbent of Lamborn, was soon in habits of social intercourse with him, dining at his table. His not mixing more with the world arose from the pain he suffered from a dangerous complaint which hastened his end, and he was excused serving the office of sheriff of the county, for which his name was three times put on the list, on account of extreme ill health, which rendered him incapable of any exertion. He was remarkable for his great knowledge and goodness of heart, a diligent inquirer after antiquities, freely imparting his discoveries to his friends. The late Mr. Da Costa describes him as a very humane, friendly, and communicative gentleman; and Morant, author of the 'History of Essex,' in acknowledging the assistance he had received from him, by the communication of several curious particulars relating to the part of the county in which he resided, notices him as "this good man." A plate of the monumental brass of Archbishop Harsnet in the work alluded to was supplied by Scott. There is no record or tradition of his having a knowledge of botany, to which his neighbour Tyson was much attached, but he left a collection of minerals, still preserved in Woolston Hall. He appears by Da Costa to have been a collector of all sorts of antiquities, charters, leaves, records, coins, abbey-seals, Roman lamps, Etruscan ware, swords, daggers, pistols, helmets, saws, and other ancient instruments, regalia, watches, sarcophagi, bronzes, idols, apparel, pictures, miniatures, and prints. A part of his collection was sold in July 1782, and about the same time, his extensive and valuable library. The mansion, now the residence of Robert Bodle, Esq., son of Robert above mentioned, still retains its venerable character, the walls hung with portraits of the family, two or three of Scott himself, one of Derham (our author), and one of his son, the President of St. John's, Oxford, in which college is another portrait of George Scott. Among the numerous antiquities, there is the little brass Mercury figured in Morant's 'History of Colchester,' also other Roman remains from that town. In the hall is a handsome carved oaken chair, the principal part of which is known to be five hundred years old.

Appendix B.

Edward Lhwyd, whose letters to John Ray, in this work, are reprinted from the 'Philosophical Letters,' was born in South Wales about 1670, and was the son of Charles Lhwyd, Esq., of Lhanvorde. He is best known as an antiquary, but he deserves more notice than he has received as a naturalist. Although many of his works are still well known, the materials for his biography seem never to have been collected together. He appears to have received his early education in Wales, and in 1687 was entered at Jesus College, Oxford. In 1701 he was created M.A. He studied natural history with great diligence as a pupil of the celebrated Dr. Plot, and, in 1690, he succeeded his master in Oxford as keeper of the Ashmolean Museum. In 1699 he published the work on fossils which gives him a claim to regard as a naturalist, and which must for ever connect him with the history of the science of palæontology. This work was entitled 'Lithophylacii Britannici Iconographia,' and consisted of a systematic catalogue of the fossils in the Ashmolean Museum, and was illustrated by a large number

of wood engravings. It was printed at the expense of Sir Isaac Newton, Sir Hans Sloane, and some of his other scientific friends. Only one hundred and twenty copies of the first edition were printed. Subsequently a new edition was published under the care of Mr. Huddesford, and to which several of Lhwyd's other contributions to palæontology were annexed. This work contains a systematic arrangement of fossils, which, whatever may be its defects, possesses the merit of being the first attempt that was made to connect the study of fossils with other branches of natural history.

The following is a list of his published works and papers from the 'Bibliotheca Britannica:

1. 'Lithophylacii Britannici Iconographia,' London, 1699. 8vo. New edition, by W. Huddesford, 1760.
2. 'Archæologia Britannica,' Oxford, 1707. Folio.
3. 'Adversaria de Fluviorum Montium, Urbium,' &c., 'in Britannia Nominibus,' 1719, London. 8vo.
4. 'Letter to the Scots and Irish.' Translated by W. Malcolm. Edinburgh, 1739. 5. Some account of a fiery exhalation in Merionethshire. 'Phil. Trans.,' Ab. iii, 671. 6. A note concerning an extraordinary hail in Monmouthshire. Ibid., 1697. 7. Concerning some regularly figured stones lately found, and observations on ancient languages. Ibid., 1698. 8. On a figured stone found in Wales. Ibid., 1699. 9. Account of some fossils. Ibid., 1704. 10. Account of very large stones voided by the urethra. Ibid., 1704. 11. Observations in natural history, made in travels through Wales. Ibid. 12. Account of some uncommon plants growing about Penzance and St. Ives, in Cornwall. Ibid. 13. On the natural history and antiquities of Wales. Ibid., Ab. vi, 19, 1713. 14. On an undescribed plant [*Tubularia indivisa*, Linn.], Ibid.

In the 'Gentleman's Magazine' (vol. lxxvii, p. 419) there is an account of the sale of Mr. Lhwyd's library, which consisted chiefly of works of antiquarian interest. Many of his letters to Dr. Martin Lister, and other distinguished naturalists, were presented by Dr. Fothergill to the Ashmolean Museum, Oxford, where they still exist.

He died in July, 1709, and his death is said to have been hastened by immoderate application to his antiquarian studies. The immediate cause was sleeping in a damp and close room in the museum at Oxford, which he chose to sleep in, for the convenience of pursuing his studies.

The following extract, giving an account of the church in the parish in which Lhwyd was born, and some account of his family, is from the MS. of the late Mr. John Dovaston, and has been kindly communicated by his son, F. M. Dovaston, Esq. A.M., of Westfelton, near Shrewsbury:

"The old church of Oswestry stood near to Llwynymaen, in a field there called to this day Caeyr Eglwys, or the Church Leasow. It was called the church of Llanforda, from its vicinity to River Morda, and was dedicated to the Holy Trinity. Near to the spot was a well of fine water, to which the vulgar do yearly resort on Trinity Sunday, where they hold a kind of wake, and drink the water of the said well, with sugar in it. No remains of this church are to be seen. Llwynymaen house is very near to where the church once stood; and I cannot pass this place without very strongly supposing that hereabouts was a Druid's place of worship; for the word Llan, or Llwyn (which is the same thing), does not signify a church. And yet we always find churches in those places so bearing the name of Llan; but it signifies a grove, or place of Druid worship, which always was in woods of oak; and Llwyn y Maen signifies 'the grove of stone;' and probably there

were formerly stone pillars erected, such as Orsedd or Meine Gwyr, or Cronlech, for the performance of their religious rites. Amongst the old names given to Oswestry, not one of them has the word Llan to them; and possibly this may be the reason, because there was no Llan or grove there, nor any church in former days, but a monastery; for the church which belonged to the town was built at Llwynymaen, where the Llwyn originally was, and was called Llanforda church, or *alonn*, a grove of trees for patriarchal worship, whence proceeds the Welsh word Llan, which, although it doth not signify a church, although at such places there generally is a church, because it was formerly a grove, or Druid place of worship; and the first preachers of Christianity to their followers, did in general erect their churches near to these groves, in order, by this means, and slow innovations of the patriarchal into that of the Christian, to convert them, which at length was accomplished; for there are many places where now there are no churches that are called Llan, from there having been groves there. * * * Llwynymaen, now mostly taken down, was an ancient stone edifice, in form of a castle, built very strong, with a square high tower at each end of it; had a gateway before the entrance, and strong doors thereto, and had once been walled round. All the demesne of Llanforda once belonged to it. It hath been for nearly 200 years past in the family of Llwhyd, the last whereof was Edward Lloyd, who died about 1557. Llanforda was given to a branch of that family, who were Lloyds of Llanforda for many years, until by marriage it came into the family of Williams. Edward Llwhyd, the antiquary, who published the 'Archæologia Britannica' in 1707, was born there. His father, Edward Llwhyd, lived there; and during his life he kept a small light carriage, with four wheels, which was drawn by dogs; and he frequently used to ride in it, and drove his dogs to Oswestry, on which account the public-house now called 'The Coach and Dogs,' which was then his property, had the sign of the Coach and Dogs."

Mr. Dovaston has in his possession a curious ancient stone sun-dial, found, in 1819, among some ruins at Llwynymaen, having on it the initials and arms of Edward Llwyd, without gnomon, showing the hour on five surfaces, the edges of the curved hollows acting as gnomons, and casting their shadows on the hours.

APPENDIX C.

The following notices, extracted from the volumes of the 'Philosophical Magazine' for 1828 and 1829, of the commemoration of the second centenary of the birthday of Ray, would have been more appropriately published with the 'Memorials,' but the Editor was not at that time aware of their existence.

COMMEMORATION OF THE SECOND CENTENARY OF THE BIRTHDAY OF RAY.

A meeting is about to take place in London, which, to judge from the name of the gentleman who has consented to take the chair, and from the stewards who have undertaken to act on the occasion, may be regarded as a national festival in honour of our distinguished naturalist Ray. Throughout the whole of a long and industrious life, that enlightened observer and sys-

tematist devoted himself unceasingly to the study of the works of the Creator, whom in those works he learned devoutly to adore. His researches extended into every branch of natural history, and in each of these he excelled. His labours were deservedly esteemed by his contemporaries, and continued to receive from succeeding writers the attention to which their intrinsic value entitled them. To them Linnæus himself was deeply indebted; and Cuvier, the first of the zoologists of the nineteenth century, does not hesitate to avow his obligations to our illustrious countryman, who laboured in the same vineyard during the seventeenth. The admiration and gratitude of every naturalist, to what branch soever of the science his attention may be more particularly directed, are justly due to Ray, and are indeed on all occasions most freely tendered. How well he merited them will readily be illustrated by even a brief enumeration of a few only of those numerous and valuable productions which we owe to his observation, his study, and his research.

Ray has been pronounced by Cuvier to be the first true systematist of the animal kingdom, and the principal guide of Linnæus in this department of nature. To him chiefly the zoologist is indebted for the excellent 'Ornithology' and 'Ichthyology' which pass under the name of Willughby. The notes collected by both were, after the decease of the latter, digested and arranged by Ray, who revised and methodised the whole, and gave to the works the form in which they were presented to the world. Both these productions are well known, and are still justly esteemed; the 'Ichthyology' especially, the principles first applied in which have been adopted by Cuvier in his primary divisions of the fishes in that great work for which he has been collecting materials during nearly the whole of his life, and of which the first *livraison* has just appeared. The posthumous publications of Ray, the 'Synopsis Methodica Avium,' and the 'Synopsis Methodica Piscium,' afford abridgments of the 'Ornithology' and the 'Ichthyology,' with numerous additions. His 'Synopsis Methodica Quadrupedum et Serpentini generis' was published during his life, and very shortly after his decease appeared his 'Methodus Insectorum.' The 'Historia Insectorum,' a work of real value, was printed some years after his death, at the expense of the Royal Society.

By Haller, Ray was designated as the greatest botanist in the memory of man. Still more emphatic is the character of him given by the late revered President of the Linnæan Society—"The most accurate in observation, the most philosophical in contemplation, and the most faithful in description, amongst all the botanists of his own, or perhaps any other time." To Ray the British botanist is indebted for the first good Flora of his native land. At an early period of his life he gave to the world his 'Catalogus Plantarum circa Cantabrigiam nascentium,' which was followed in a few years by his 'Catalogus Plantarum Angliæ et Insularum adjacentium.' The third edition of the latter work was entitled 'Synopsis Methodica Stirpium Britannicarum,' and is still universally known. This also passed through three editions, the last of which was considerably enlarged and improved by the celebrated Dillenius. His earliest attempt as a general systematist was the 'Methodus Plantarum nova,' in which, availing himself of the labours of former writers, corrected by his own philosophical genius, he produced an outline in several respects superior to those of his predecessors. His later 'Methodus Plantarum emendata et aucta' adopts many of the views advanced by his generous rival and contemporary, Tournefort. These systems, modified from time to time according to his continually increasing knowledge, had

been employed in his 'Synopsis,' and in conformity with them he digested his 'Historia Plantarum generalis,' a work of immense labour and research, which contains descriptions of nearly 20,000 species of plants, arranged in a systematic order, many of the groups of which are purely natural, and agree perfectly with those admitted by the best informed of modern botanists. In the first book of this history, entitled De Plantis in genere, Ray fully established his rank as a physiological botanist. His detached remarks on the motion of the sap in plants, and on other points of vegetable physiology, are there embodied with the principal discoveries made by previous or contemporary writers, so as to form, according to Du Petit Thouars, the most complete treatise which yet exists on vegetation taken as a whole. "To isolate this book, and to reprint it in a separate form," continues that distinguished botanist, "would constitute the most noble monument that could be erected to the memory of Ray."

As a geologist, the fame of Ray must rest on his three physico-theological discourses concerning the primitive Chaos and Creation, the General Deluge, and the Dissolution of the World, a highly popular work, which was frequently reprinted, and which proposes a theory at least as plausible as any which had then appeared, or was advanced until long after its publication. A portion of his Collection of Unusual or Local English Words, with the Preparation of Metals and Minerals in England, &c. proves also that he was by no means neglectful of this interesting branch of natural science so often as he possessed opportunities of attending to it.

The preceding list, copious as it appears, contains only the more important works of Ray as a naturalist, without including his Appendices, his Supplements, his Catalogues, his detached papers, &c., and without adverting to his various publications on philology, his travels, his philosophical treatises and letters, and his theological productions. Of the latter, one, however, cannot be passed by without notice. Few works have been more frequently reprinted than 'The Wisdom of God manifested in the Works of the Creation,' and none have better deserved the popularity they have enjoyed. On the character of its author, whether as a naturalist or a divine, that lasting monument of his knowledge and his piety confers equal and immortal honour.

Ray was born on the 29th of November, 1628. The two hundredth anniversary of his birthday is now rapidly approaching. It will be celebrated in a manner worthy of the man and of the occasion. The cultivators of natural science, in each of its various branches, are anxious to take a share in the commemoration of the event.

The President of the Royal Society, Davies Gilbert, Esq. M.P., has consented to act as chairman at the proposed dinner, and the following gentlemen have already accepted the office of stewards:

P. M. Roget, M.D. Sec. R.S.
E. Forster, Esq. V.P. and Treas. L.S.
J. Sabine, Esq. Sec. Hort. Soc.
Rev. W. Kirby, F.R.S. &c.
J. E. Bicheno, Esq. Sec. Linn. Soc.
R. Taylor, Esq. Assistant-Sec. Linn. Soc.
W. J. Broderip, Esq. Sec. Geol. Soc.
N. A. Vigors, Esq. Sec. Zool. Soc.
E. T. Bennett, Esq. Vice-Sec. Zool. Soc.
T. Bell, Esq. F.R.S. &c.
J. Brookes, Esq. F.R.S. &c.

Rev. W. Buckland, D.D. F.R.S. Prof. Min. and Geol., Oxford.
J. G. Children, Esq. F.R.S. &c.
Rev. J. Goodall, D.D.
R. E. Grant, M.D. Prof. Zool. Univ., London.
G. B. Greenough, Esq. F.R.S. &c.
Major-General Hardwicke, F.R.S. &c.
Rev. J. S. Henslow, F.L.S. Reg. Prof. Bot., Cambridge.
A. B. Lambert, Esq. V.P.L.S.
J. Lindley, Esq. F.R.S. Prof. Bot. Univ., London.
J. Morgan, Esq. F.L.S.
J. F. Stephens, Esq. F.L.S.
N. Wallich, M.D. F.R.S. Ed. Cur. Bot. Gard., Calcutta.
W. Yarrell, Esq. F.L.S.

To this list additions are still making daily.

COMMEMORATION OF RAY.

The proposal for employing the occasion of the second centenary of the birthday of the illustrious John Ray, which happened on the 29th of November last, for the purpose of a public expression of the high estimation in which he is held at this day by the lovers of every branch of natural history, was eagerly adopted, and the public dinner at Freemasons' Hall was attended by about 130 of the most distinguished cultivators and patrons of science, including most of the officers of the Royal, Linnæan, Geological, Horticultural, and Zoological Societies, the Rev. the Provost of Eton, and several of the professors of the Universities of Oxford, Cambridge, and London.

Davies Gilbert, Esq. M.P., the much-respected President of the Royal Society, took the chair, supported by His Grace the Duke of Somerset, President of the Royal Institution, Lord Astley, and other persons of distinction.

In proposing "The Memory of Ray," the chairman said that he felt it to be his duty to express his sincere acknowledgments to the company for the high honour they had done him in calling him to the station he then so unworthily filled. He was aware that so gratifying a compliment had been paid to him solely on account of his occupying the chair in which the too great kindness of the Fellows of the Royal Society had placed him; but he valued it the more from that reflection. That society had been greatly honoured by having such a distinction conferred upon it; and he spoke the sentiments of every member of the Royal Society when he returned to the company his sincere thanks on their behalf for this distinction. To take an active part on such an occasion must be gratifying to every friend of science and of virtue; but, however much pleasure might be felt in participating in the proceedings of that day, and doing honour to the memory of a truly great man, still far more satisfaction must be derived from a consideration of the good effects which such a meeting must produce. Men who had done good service to their country, whether in the field of science or elsewhere, were entitled to its grateful remembrance. The display of that remembrance was calculated to incite others to an honorable struggle for similar distinction; and he was sure that when these proceedings should become known, they would tend greatly to promote the cultivation of the science of natural history. On the merits of the illustrious man whose birth they had met to commemorate, although any remark from him must be unnecessary, he could not avoid saying a few words. The state of science at the period in which

Ray lived must be so well known to those present, that it must be useless for him to refer to it, except to remind them of the difficulties with which he had to contend. To show the extent and importance of the labours of Ray, he would mention some of the principal works which he had produced. Among them were—'Historia Plantarum Generalis;' 'Catalogus Plantarum circa Cantabrigiam, &c. with Appendices;' 'Methodus Plantarum circa Cantabrigiam,' &c.; 'Catalogus Plantarum Angliæ et Insularum adjacentium;' 'Catalogus Stirpium in exteris regionibus observatorum;' 'Synopsis Methodica Animalium Quadrupedum, &c.;' 'Synopsis Methodica Avium et Piscium;' 'Methodus Insectorum;' 'Observations made in a Journey through part of the Low Countries, Germany, Italy, and France, with a Catalogue of Plants, not natives of England;' to which is added, 'An Account of the Travels of F. Willughby through Spain, and a Collection of Travels into the Eastern Countries;' 'A Collection of English Proverbs and unusual Provincial Words;' 'Dictionarium Trilingue;' 'An Itinerary through England;' 'Translation of Bishop Wilkins's real Character;' various sermons and theological works. The work published by Mr. F. Willughby, under the title of 'Ornithologiæ libri tres,' &c. was known to be principally by Ray. In the 'Philosophical Transactions' were printed, among other papers, On the manner in which Spiders project their Threads; On the Dissection of a Porpoise; On the Swimming-bladders of Fish; On the Effects of Poisonous Roots, and the Virtues of the Leaves of Hemlock; and Observations (1699) made on the Comet that appeared at Rome; and the last of his works which he should mention was 'The Wisdom of God manifested in the Creation.' This had been very frequently reprinted, and was clearly the prototype of a late celebrated book on the same subject. He had read the work of Ray with infinite delight, and it was alike an honour to his head and to his heart. But although his productions were so numerous, it was by their excellence that they commanded attention. Ray was the first who reduced natural history to a system, and prepared the way for those more perfect arrangements which have since had so salutary an influence on its cultivation. It was to his penetrating genius and indefatigable exertions that the civilized world was indebted for many most important discoveries. If he did not himself always arrive at the goal, he pointed out the road; and it was to his pursuing the course he had commenced that we owed our present advanced state in many particulars of natural history. Haller felt how much he owed to Ray, and he termed him "the greatest botanist in the memory of man." Ray very early distinguished himself. While at college he acquired a high fame, and some of the exercises he performed there have been found to be worthy of preservation even to this period. They formed the foundation of some of his late and important works.

"Of this inestimable writer," says Stillingfleet, in his 'Calendar of Flora,' "whose works do honour to our nation, as a late disciple of the great Swedish naturalist justly observes, I cannot help saying further, that no writer till his time ever advanced all the branches of natural history so much as that sagacious, diligent, English observer, whose systematical spirit threw a light on everything he undertook, and contributed not a little to those great and wonderful improvements which have since been introduced."

He was invited to become a member of the Royal Society in 1667; and he happily lived in amity with some of the most able and most virtuous men of his age. It was to do justice to the memory of such a man that they were then assembled, and he would not longer detain them from drinking

with gratitude and veneration to the memory of the disciple of Bacon and friend of Locke, the intimate friend and contemporary of Willughby, and the precursor of Haller and Linnæus.

After toasts to "The Memory of Linnæus," and "The Improvement of Natural History,"—

Mr. Bicheno (Secretary to the Linnæan Society) proposed, "Prosperity to the Royal Society." In giving such a toast, and in such a company, all remark must be unnecessary; still he might be allowed to say, that he proposed it from his heart, and that he did so principally from having, in an official situation in another society, experienced the good effects which proceeded from its fostering care, its kindly protection, and the powerful assistance it extended to other societies, especially to that to which he belonged, when they had arrived at maturity. He then pronounced a warm eulogy on Ray, whom Cuvier had justly called *un Méthodiste*, and whose works he had studied, still with fresh advantage, for the last twenty years. Ray was indeed a methodist: he was the first who arranged the grand outlines of natural history, and enabled every one to become acquainted with the groups, the grand formations of nature. With the minute particulars of his subject, Ray had not much interfered; but he had originated that system of arrangement which gave perspicuity to the labours of others, and had accurately described the character of nature's grand operations. No doubt he had gathered much from Grynæus; but still, even in the application of what he had gathered, he had done a vast deal. Most ages were proud of the advances they had made in science. While, however, we boasted o. systematic arrangement, it should be remembered that, although the natural method was too much overlooked during the latter part of the last century, Ray first discovered its value. As a zoologist, he was not prepared to speak of that great man; but in that branch of natural history with which he might pretend to some acquaintance, he felt an admiration for his genius beyond the power of language to express.

The Chairman, on proposing "Prosperity to the Linnæan Society," gave a sketch of its origin. It was, in truth, a branch of the Royal Society. It had been formed on the suggestion of the late Sir Joseph Banks, in consequence of the multiplicity of business the Royal Society had been called upon to attend to. How well it had discharged its duties the scientific world well knew.

Mr. Lambert, Vice-President of the Linnæan Society, returned thanks; and

Mr. E. Forster, Vice-President and Treasurer, said, that born and educated in the same county with Ray, he had been taught from his infancy to admire that great man; and his admiration soon became veneration, from a study of his writings. Nearly forty years ago he had first visited his tomb, before it had long since undergone a repair at the expense of a gentleman present (Sir Thomas Gery Cullum). In his pilgrimages to Ray's tomb,* he had felt

* It has lately been repaired again by Mr. Walker, the rector of Black Notley. Mr. Tyson, in a letter to Mr. Cole, 1779, says, "One part of my ramble was to visit the last residence of that pious philosopher, Mr. Ray, Black Notley, *con amore*. I made a drawing of the church, and of his monument in the churchyard. The parish clerk had such remembrance of him from others, that he related various incidents. The clerk pointed out to me the farm-house which was once his dwelling. I there saw his library (that is, the room which once contained his books), and his garden below it,—about an acre of ground. Here the father of English naturalists lived employed and happy."

great delight in seeing also the place of his birth, the church in which he had been baptised; and in entering the house in which this good man had lived and died, it was pleasing to reflect that he was treading the very boards which Ray had trodden, and that he was looking, perhaps, on trees and plants which Ray had admired. The Linnæan Society was proud of being thought so nearly connected with the chief labours of Ray; but that great philosopher ought not to be considered merely as a botanist, we must look on his character as a man. "His religion was pure and free from cant; his piety sincere, and without affectation; his morality consistent, and his manners gentle, affable and kind to those around him." One proof only of his integrity need be mentioned, his having resigned his fellowship; and, though reduced to poverty, refused all further preferment in the Church, because he would not declare that those who had sworn the solemn league and covenant might break their oaths; not that he had himself signed it, for he thought it an unlawful oath;—yet he could not conscientiously make the declaration required.

"Prosperity to the Geological Society" having been given, the President (Dr. Fitton), in returning thanks, stated his concurrence in all that had been said respecting the great merit of Ray as a naturalist, and the excellence of his private character. Ray was in fact, he said, an honest man;—he gave up station and emolument rather than swear to what he did not believe;—and if such examples of integrity were not found amongst those who devote themselves to the pursuit of truth, where else, he would ask, should they be looked for? In geology, Ray made many sagacious observations, and entertained some opinions much beyond the state of the subject in his own time. But our chairman had justly stated, that geology, as a distinct branch of knowledge, had not then obtained a name; and in fact it supposes such an advanced state of scientific inquiry, that it scarcely could have existed till a much later period. The geologist, it is true, is in a great measure nothing more than a physical geographer,—and all that constitutes his exclusive business lies within a very narrow compass; but he requires a high degree of cultivation in several other departments of inquiry with which his own is allied, especially in chemistry, zoology, and botany; for what without these would be geology at the present day? Instead of regretting this state of dependence, he was rather disposed to rejoice at it, since it tended to produce more frequent intercourse with those who are engaged in the pursuit of other branches of natural science; so that when he looked about him in such an assembly as the present one, he felt that he was surrounded with benefactors; and great as the merit of Ray unquestionably was, as an original observer of the earth's structure, he was disposed to rate still more highly the services he had rendered to geology, by contributing to the perfection of those other departments of natural history, to which his attention was principally devoted. But there were more general views, which made him rejoice that a meeting like this had been brought together. It proved, and must if possible contribute to increase, the cordiality of intercourse and feeling that distinguish, so very creditably, the naturalists of this country; and it tended also to increase their power and resources. It had been said, perhaps with too much truth, that England, notwithstanding the number and wide distribution of its colonies, has done much less to advance the natural history of foreign countries than might have been expected: occasional meetings like the present must facilitate the inquiries of our naturalists, not only by enabling them to combine their own exertions, but by impressing upon the government of the country the importance and value of the researches in which they are engaged. In a country like ours, the government itself could

not, perhaps, be expected to originate measures for the improvement of natural knowledge; it is for you, therefore, to suggest them; the government can have no other wish than to give effect to the suggestions of disinterested and well-informed men. On every ground, therefore, both of general feeling, and as a member of a society, to the success of which the progress of the other departments of natural history is almost essential, he was happy that this meeting had been held, and had peculiar pleasure in being present upon such an occasion.

Mr. Greenough passed a high eulogy on the character of Ray; and said that the meeting gave a strong proof that honorable exertions were never thrown away. Independent of the inward pleasure they gave, they were sure of receiving the admiration of the good and the informed. After some remarks upon the rapid spread of the study of geology, he concluded by expressing his hope that that science would daily become more general.

"The Zoological Society" was then given; and Mr. Vigors, in returning thanks, spoke of the high sense now entertained of Ray's merits as a philosophical zoologist, and alluded to the advantages which were to be expected from the establishment of the Zoological Society.

On the healths of the naturalists of Great Britain and Ireland being drunk, coupled with the name of Mr. Kirby, the rev. gentleman said that he had never before addressed a public assembly of a festive character; but he felt it right to take that opportunity of testifying his admiration of the great and good Ray. He was great as a natural philosopher, and great also as a moral philosopher. He penetrated the world of science further than any of his contemporaries, and by his exertions formed a bright constellation of information, whose beams had served as a guide and beacon to more modern labourers. In entomology, the branch of science to which he himself was devoted, the naturalist of the present time was indeed deeply indebted to Ray, who had combined the system of Aristotle with that of Swammerdam, and cleared the way for Linnæus. Much had been done to unveil nature, but still much remained to be done; and he hoped that a course of perseverance would be pursued until all was accomplished.

The healths of Cuvier and Jussieu, and the naturalists of Europe, were drunk with much approbation.

Dr. Buckland's health, and "Prosperity to the University of Oxford," having been most cordially received; the learned professor addressed the meeting as follows:

"The President of the Royal Society has already informed you, by a detailed examination of his extensive works, how great are the advantages which natural history has derived from the labours and the genius of Ray; and in the presence of so many illustrious botanists as I now see assembled in this place, it would be highly presumptuous in me to say one word on the benefits, the inestimable benefits, which he has conferred on the science of botany. My excellent friend and colleague, Professor Sedgwick, were he now present (and I regret that severe illness alone has caused his absence), would tell you how extensively the influence of his exertions and his example have operated to excite a taste for natural knowledge in the University of Cambridge,—a taste which he, a member of the same college, and animated with the same spirit as the immortal Ray, maintains and keeps alive in the present generation with a zeal and talent worthy to follow his great predecessor in the field of natural science.

"As a member of the University of Oxford, I rejoice to bear most ample testimony to the lasting benefits which the exertions of the age and friends of Ray have transmitted to that seat of learning, to which it is my happiness

to belong. The labours of Lister, Plot, and Ashmole, of Lloyd, and of Robert Boyle, and the establishment of the Botanic Garden and of the Ashmolean Museum, mark in our University the burst of a kindred flame to that which Ray had excited in the sister University, and laid in Oxford the foundation of that right method of investigation, and of making collections in natural history, which have been transmitted to our own time. In the department of science to which my own attention is peculiarly directed, the genius of Ray had made advances that would do honour to the present day. In his 'Treatise on the Wisdom of God in the Creation,' he points out examples of design and utility in the form and structure and composition of our planet, founded on extensive and accurate observation of facts, and illustrated with sound argument, mixed with much good feeling and good sense. And in his 'Discourses on Chaos, Creation, and Deluge,' there is a knowledge of many phenomena of the earth's surface, the discovery of which the present generation are too apt to consider as exclusively their own: that important and leading doctrine of the Huttonian theory, which attributes the elevation of islands, mountains, and continents to the force of vapour acting from below, is set forth in words that form almost an exact parallel to the statements of the same theory in Playfair's 'Illustrations;' the theory in neither case was new; it was, indeed, handed down from high antiquity, but it is illustrated by Ray with such abundant arguments and examples, derived from the effects of earthquakes and volcanoes which in his time raged so terribly in Jamaica, and with such copious and judicious references to the authentic records of the elevation of Thera, Therasia, and other volcanic islands, that the essence and leading features of much that has been written since, on the theory of elevation and disturbance by subterranean vapours, have been anticipated by Ray. His remarks on the 'Structure of Mountains,' as containing and affording access to metallic veins, their influence on climate, and use in collecting clouds for the formation of rain and production of rivers; his observations also on the general diffusion of springs, and their never-failing supply of water, as derived from rains and dews, show much accurate observation, and point out correct conclusions which have been often repeated, but rarely surpassed, by his followers on these subjects.

"In another curious and extensive branch of geological inquiry which relates to the history of fossil shells, he contended (in opposition to the prevailing theories of his predecessors and of many of his contemporaries) that they were not accidental results of the plastic power and the sport of nature, but the real and true exuviæ of animals that formerly inhabited them. He contended further, that these shells for the most part belong to species unknown in our existing waters, but recommends caution in pronouncing them to be absolutely extinct until we know the contents of the bottoms of all our deepest seas. Can it be said that modern geology has advanced on this point much further than Ray?

"Again, with respect to the prevailing taste and studies of his time, he complains that men are too much occupied in the study of words, and too regardless of the study of things; exclusively absorbed in attending to the works of the creature, and regardless of the works of the Creator; admiring and collecting carved ivory and curious instruments of human invention, but insensible of the exquisite and ten thousand times more admirable mechanism that pervades the animal and vegetable worlds.

"He complains further, that men are too much disposed to rely on the authority of others, and too little willing to undertake the labour of investigating nature for themselves; he stimulates them to exertion by the hope of useful discoveries, any one of which may amply reward the labours of a life.

"Such were the feelings and such the principles by which his energetic soul was ever actuated; such the exertions to which he called on his contemporaries;—constant and strenuous exertions to extend the sphere of human knowledge and useful discovery, and thereby advance the welfare of mankind. And surrounded as I now am by a host of individuals, the most illustrious members of the numerous learned and philosophical societies which in our day have arisen to adorn and benefit our country, I feel that you all not only sympathise with me in admiration of the great example he has set us, but yourselves rejoice to follow in those paths of useful labour which Ray not only pointed out, but was himself indefatigable to pursue. To do just honour to the memory of so great and good a man is the object of this day: a man whom as an individual we must ever esteem, love, and venerate, and whose name the annals of philosophy will never cease to record among the first founders and benefactors of natural science."

On giving "The University of Cambridge," the Chairman took notice of the expulsion of Ray from that University, which harsh act he was disposed to attribute to the persecuting spirit which raged without the walls of that learned seminary. He could say of many of the present members of Trinity College, that they regret that the violence of the times had compelled their predecessors to acquiesce in the retirement of Mr. Ray from his fellowship, for refusing to subscribe a declaration altogether unwarrantable. Oxford had as much to answer for in regard to her treatment of Mr. Locke.

The Rev. Professor Henslow returned thanks. He remarked that the University of Cambridge had, so far as the marble or the canvas could make amends, endeavoured to atone for the little, or, he should rather say, the great, injustice which Mr. Ray had sustained. The bust of that great man was ranged by the side of those of Newton, Boyle, Barrow, Dryden, and Willughby; and his portrait was considered to confer honour on the place in which it was. But Cambridge might with justice boast of possessing a far more powerful proof than those of the estimation in which it held the genius and conduct of Ray. His spirit still lived there: and although the study of natural history had not yet been brought to that degree of perfection there which it might be, he hoped the day was not far off when it would command general attention: such pursuits he considered the best correctives of fanaticism and bigotry.

"The Universities of Edinburgh, Glasgow, and London," and the healths of Baron Humboldt and Dr. Wollaston having been severally drunk, the Chairman retired, amidst the applauses of the company.

The health of Mr. Children, who suggested the commemoration, was then given with hearty approbation, and the company separated, after having spent a day which they will long remember with delight.

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